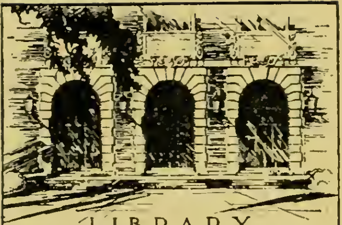

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BEETON'S BOOK

OF

GARDEN MANAGEMENT:

COMPRISING INFORMATION ON

- LAYING OUT AND PLANTING GARDENS.
- FRUIT, FLOWER, AND KITCHEN GARDEN MANAGEMENT.
- BUILDING, ARRANGING, AND MANAGEMENT OF GREENHOUSES, AND OTHER GARDEN STRUCTURES.
- DECORATIVE GARDENS.
- SPADE HUSBANDRY, AND ALLOTMENT CULTIVATION.
- MONTHLY OPERATIONS IN EACH DEPARTMENT.
- ORCHARD CULTIVATION, AND MANAGEMENT OF ORCHARD-HOUSES.
- THE MANAGEMENT OF BEES.

Samuel Orchart Beeton

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PREFACE.

CUSTOM authorizes a Preface, the object of which is, I suppose, that the writer may apologize for his own short-comings, if he has discovered them, rectify his omissions, and entice the reader, by gentle entreaties, to dip into his pages; or, at least, to take his leave in a manner calculated to keep his memory green in their recollections. In the present work the writer is conscious of many deficiencies: the subject is a very large one, and a book of much larger dimensions could hardly pretend to be more than a Book of Hints on the Management of the Garden; but it is the man who can appropriate hints, improve upon, and make them his own, who is the true gardener. This is strikingly "put" in an anecdote related by Sir E. L. Bulwer Lytton, in the delightful series of Essays on "Life, Literature, and Manners," now publishing in *Blackwood's Magazine*.

"A certain nobleman, very proud of the extent and beauty of his pleasure-grounds, chancing one day to call on a small squire whose garden might cover an acre, was greatly struck with the brilliant colours of his neighbour's flowers. 'Ay, my Lord, the flowers are well enough,' said the squire; 'but permit me to show you my grapes.' Conducted into an old-fashioned little greenhouse, which served as a vinery, my lord gazed with mortification on grapes twice as fine as his own. 'My dear friend,' said my lord, 'you have a jewel of a gardener; let me see him.' The gardener was called—a simple-looking young man, under thirty. 'Accept my compliments on your flower-beds and your grapes,' said my lord, 'and tell me, if you can, why your flowers are so much brighter than mine, and your grapes so much finer. You must have studied your profession very profoundly.'—'Please your lordship,' said the man, 'I ben't no scholar; but as to the flowers and the grapes, the secret of treating them as I do just came to me by chance.'"

The "chance" was this:—Being in London, he had accidentally overheard a discussion between two medical men on the merits of charcoal in cholera; one of them mentioning its good effects on sickly vines, and, says he, "see how a sprinkling of it will brighten up a flower-bed." The young gardener followed up the hint, and tried the charcoal dressing.

"'And that's how the grapes and flower-beds came to please you, my lord; it was by a lucky chance that I overheard these gentlemen, please your lordship.'

"'Chance happens to all,' answered the peer, sententiously; 'but to turn chance to account is the gift of few.'

"His lordship returned home, gazed gloomily on the hues of his vast parterres, and scowled at the clusters of grapes; he summoned the gardener, communicated what he had seen and heard, and produced a bunch of grapes he had brought from the squire's vines.

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"'My lord,' said he, 'Squire ———'s gardener must be a poor ignorant fellow to fancy he has discovered a secret in what is known to every horticulturist. Liebig, my lord, has treated of the good effect of charcoal-dressing to vines especially, and it is easily explained;' and therewith the wise man entered on a very profound explanation, of which his lordship did not understand one word.

"'Well, then,' said the peer, cutting short the harangue, 'since you know all this so well, have you ever tried it on mine?'

"'I can't say I have, my lord; it did not chance to come into my head.'

"'Nay,' replied the peer, 'chance did put it into your head, but thought never took it out of your head.'"

The result was, that my lord begged the young gardener of the squire; he took some pains to train and educate him, and the man is now my lord's head forester and bailiff. But it was neither for the sake of the story that I have repeated this anecdote, nor for the fact about the charcoal, although the one is interesting in itself, and the other, within certain limits, perfectly true; for charcoal absorbs ninety times of its own bulk of ammoniacal, and thirty-five of carbonic acid gas, which are separated again by simply moistening with water. But the story points a moral. A workman, no matter in what capacity, who reasons on what passes under his eye, will find new ideas continually rising in his mind. Let these be noted as they occur, and they may chance to help him some day when he does not expect it. If the reflections suggested to Newton by the falling apple had only led to a record of the fact, the great discovery of the doctrine of universal gravitation would have been reserved for another. It is the power of reasoning on analogous things which distinguishes the philosopher from the common herd,—the gift of perception, added to the power of imitating the harmonies of nature, which distinguishes the artist from the daubster; and the same qualities, although, perhaps, in a lesser degree, which distinguish the gardener from the mere labourer.

In conclusion, while claiming for the larger portion of the Book of Garden Management no more merit than belongs to a fairly-balanced compilation, drawn from widely-spread but sound sources of information, some of the contributions will be found to merit much higher praise. Among these the editor may be permitted to claim attention to the very original contributions of Mr. D. T. Fish, signed with his initials; to the painstaking communications signed F. C.; and to the scholarly contributions of the Rev. H. P. D., who is also kind enough to overlook the fact, that some of his communications are mixed up with editorial articles, where the initials could not very well be given.

LONDON, *September*, 1862.

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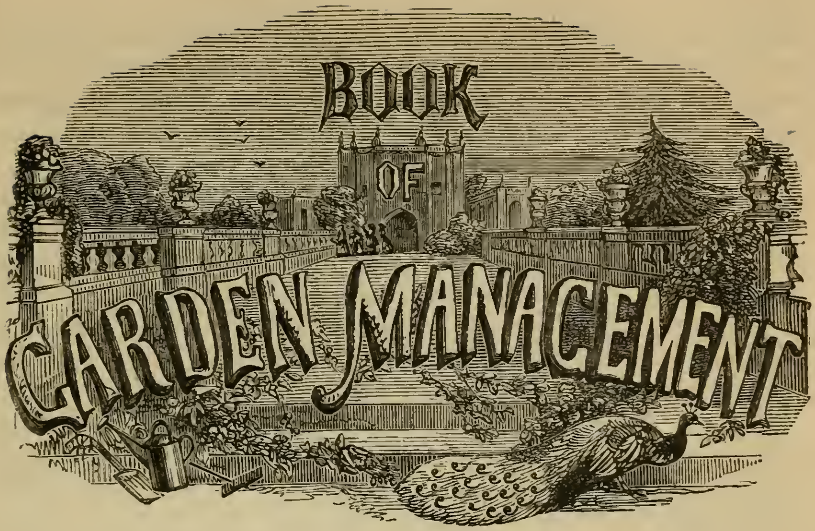


CHAPTER I.

HISTORICAL SKETCH OF GARDENING.

1. Gardening, as an industrial art, existed in very remote antiquity. Not to speak of the fabled gardens of Hesperides and of Alcinous, each of them—

> "Four acres the allotted space of ground,
> Fenced with a green inclosure all around;"

or the hanging gardens of Babylon, by which the Babylonian monarch sought to reconcile his Median queen to the flat and naked country of her adoption, and banish from her memory the regretted Median hills and forests, we find among the Romans not only traces of extensive garden cultivation, but a garden literature, which has probably not a little influenced our own. The kings of Rome seem, indeed, to have been their own gardeners; for Pliny tells us that Tarquin the Superb sent a certain cruel and sanguinary message from the garden which he was then cultivating with his own hands, to his son; and he adds, "At the present day," that is, about the year 80 or 90 of the Christian era, "under the general name of Hortorum, we have pleasure-grounds situated in the very heart of the city, as well as extensive fields and villas. The garden constitutes the poor man's field," he proceeds to say,—"from it the lower classes procure their daily food;" and after a sneer at the disciple of Epicurus, who risks the peril of shipwreck in seeking for oysters in the abysses of the deep, or who searches for birds beyond the river Phasis at the risk of being eaten up himself while battling with wild beasts and trying to take a pheasant, he exclaims, "And yet, by Hercules! how little do the productions of the garden cost in comparison with these!" Pliny goes on to utter bitter complaints that these cheap and simple luxuries are being placed beyond the reach of the poor by the luxurious demands of the rich for monstrosities of high cultivation. "We might be contented to allow of fruits being grown of exquisite flavour. We might allow wines being kept till they were mellowed with age, or enfeebled by being passed through cloth strainers; but do we not find that these refined distinctions are extended to the very herbs? The cabbages are pampered to such an extent, that the poor man's table is not large enough to hold them. Asparagus Nature intended to grow wild, so that all might gather it; but, lo and behold! we find it in such a state of cultivation that Ravenna produces heads weighing as much as three to the pound. Alas! for the monstrous gluttony."

2. After an exordium deprecating such high cultivation as a direct means of depriving the poor of their natural food, in the course of which we learn that the women were the chief cultivators of the kitchen-garden among the Romans; that its appearance in the days of Cato the Censor was considered as the test of a good or careless housewife; and that the lower classes in Rome had their mimic gardens in the windows, as we have our window gardening; he concludes thus: "Let the garden, then, have its due meed of honour; let not its products, because they are common, be deprived of a due share of our consideration; for have not men of the highest rank been content to borrow their surnames from it? Have the Lactucini thought themselves disgraced by taking their name from the Lettuce, or the Fabii and Lentilii from the Bean and the Lentils? But we are ready to admit, with Virgil, that it is difficult by language to ennoble a subject, so humble in itself,—

"'In tenui, at tenuis non gloria.'"

3. It thus appears that early in Roman history, garden cultivation had not only made considerable progress, but that it had a tolerably extensive literature. Cæsar had his—

"Private arbours and new planted orchards
On this side Tiber."

Cicero had his villa and gardens, in which flowers were one of his delights, and—

"The Pæstan roses, with their double spring,"

were as celebrated as the fruits from the garden of Lucullus.

4. The Italian style of gardening is probably a perfected continuation of that of the Romans, with whom it was an amplification of the house itself.

> "A pillar'd shade,
> With echoing walks beneath,"

Broad paved and sunny terraces and shady colonnades connected in their style with the house. Marble fountains, statuary, and vases, and other vestiges of ancient art found in the ruins, out of which they have been raised, are the chief characteristics of the magnificent gardens of modern Italy, and nothing can be nobler than this style when the accessaries are all in keeping. "In spite of Walpole's sneer," says Mr. Bellenden Kerr, "about walking up and down stairs in the open air, there are few things so beautiful in art as stately terraces, tier above tier, and bold flights of stone steps, now stretching forward in a broad, unbroken course; now winding round the angle of the terrace in short steep descents; each landing affording some new scene, some change of sun or shade—a genial basking-place or cool retreat,—here the rich perfume of an ancestral orange-tree, which may have been in the family three hundred years,—there the bright blossoms of some sunny creeper,—while at another time a balcony juts out to catch some distant view, or a recess is formed with seats for the loitering party to 'rest and be thankful.' Let all this be connected, by means of colonnades, with the architecture of the mansion, and you have a far more rational appendage to its incessantly artificial character than the petty wildernesses and picturesque *abandon*, which have not been without advocates, even on an insignificant scale."

5. The French and the Dutch have each their distinct styles of gardening,—the French generally theatrical and affected, straining after effect with spectacle and display. Even at Versailles, which represents two hundred acres and eight millions sterling, the geometric style of Le Notre differs in little from its predecessors or its fellows, except in its extent and magnificence. Here, as elsewhere, in the production of his school,—

> "Grove nods at grove, each alley has its brother,
> And half the garden just reflects the other."

Its wonder was the labyrinth in which thirty-nine of Æsop's fables were represented by means of copper figures of birds and beasts, each group being connected with a separate fountain, and all spouting water.

6. In the Dutch style, there is a great profusion of ornament on a small scale:—

> "Trees cut to statues, statues thick as trees;"

canals and ditches made to accommodate the bridges thrown across them; caves, waterworks, banqueting-houses, and the never-failing *lust-haus* (summer-house) with a profusion of trellis-work and green paint, furnished, as Evelyn has it, "with whatever may render the place agreeable, melancholy, and country-like," but abounding also in beautiful grassy banks and green slopes, unknown in French gardens.

7. In our own country, gardening, as an art, much less as a science, is of comparatively modern date, but in no other country has it made such progress. The universal aspiration, "Give me but a garden," pervades young and old of our race. Our travellers ransack the Old World and the New for new plants with which to beautify our gardens. The footsore and weary and rather eccentric Australian traveller in Leichhardt's "Overland Expedition" erected his tent, generally at a distance from the rest under a shady tree or in a green bower of shrubs, where he made himself as comfortable as the place would allow by spreading branches and grass under his couch, and covering his tent with them to keep it shady and cool, *even planting lilies in blossom before his tent*, in order that he might enjoy their sight during his short stay. Under these circumstances, it is not surprising that our garden literature should be extremely copious. For this taste, as well as the early rudiments of gardening, we are probably indebted to the Romans; for Strabo, writing in the first century, tells us that the people of Britain were ignorant of the art of cultivating gardens. The continual wars in which Britain was engaged from the fifth century, when the Romans vacated the island, probably rooted out all traces of an art so civilizing as gardening, although there are indications that vineyards planted in the third century, under the Emperor Proteus, existed in the eighth century, when they are mentioned by the Venerable Bede; while William of Malmsbury, writing in the twelfth century, commends the vineyards of the county of Gloucester; and Pliny tells us that cherries, which Lucullus had introduced into Italy about a century before, were grown in Britain in the first century. Throughout the transition period which succeeded the Roman conquest, the warlike barons and discontented people were probably too much occupied in looking to their personal safety to think much of gardening. The opulent earls of Northumberland, whose household consisted, in 1512, of a hundred and sixty persons, had but one gardener, who, according to the "Household Book," attended "hourly in the garden for setting of erbes, and clipping of knottis, and sweeping the said garden clene." In Scotland—if we may trust to the authority of the royal poet James I.,—that poor country had already established some claims to the reputation which has since carried so

many of her sons over the world as gardeners. In his poem of the "Quair," written early in the fifteenth century, the poet speaks of—

> "A garden fair, and in the corneris set,
> Ane herbere green with wandes long and small.
> Railit about, and so with treeis set
> Was all the place, and hawthorn hedges knet,
> That lyfe was non, walkying there forbye
> That might within scarce any wight espye,
> So thicke the bewis and the leves grene."

8. Toward the end of the fifteenth and in the early part of the sixteenth century, the wise and politic Henry VII. had nearly succeeded in rooting out the feuds of the Roses red and white, and a long reign of comparative repose had no doubt prepared the people for the revival of gardening with the other arts of civilization, which took place in the succeeding reign of Henry VIII. The royal gardens of Nonsuch were laid out by this monarch with the greatest magnificence. "Nonsuch," says its historian Hentzner, "is so encompassed with parks, delicious gardens, groves ornamented with trellis-work, cabinets of verdure, and walks so embowered by trees, that it seems to be a place pitched upon by Pleasure herself to dwell in along with Health. In the pleasure and artificial gardens are many columns and pyramids of marble; two fountains spout water one round the other like a pyramid, upon which are perched small birds that stream water out of their bills. In the grove of Diana is a very agreeable fountain, with Actæon turned into a stag as he was sprinkled by the goddess and her nymphs. There is besides another pyramid of marble with concealed pipes, which spirt upon all who come within their reach;" so that it may well claim pre-eminence, and justify the poet, who tells us—

> "This, which no equal hath in art or fame,
> Britons deservedly do Nonsuch name."

9. During Elizabeth's reign, Holland and Hatfield House were both laid out. Of the former, part of the original plan still remains; of Hatfield, Hentzner says, "the gardens are surrounded by a piece of water with boats rowing through the alleys of well-cut trees and labyrinths made with great labour." Mazes and labyrinths and concealed pipes, by means of which visitors might find themselves lost one minute, and deluged with water at the next, seems, indeed, to have been the taste of that day—a jocular sort of hospitality "more honoured in the breach than the observance."

10. During the reign of James I., Theobalds was laid out. "A large

square, having all its walls covered with phillyrea, and a beautiful *jet d'eau* in the centre, the parterre having many pleasant walks, part of which are planted on the sides with espaliers, and others arched all over. At the end is a small mount, called the Mount of Venus, placed in the midst of a labyrinth, and which is, upon the whole, the most beautiful spot in the world." During this reign, the subject engaged the comprehensive mind of Bacon, with little immediate result; but the contempt he expresses for "images cut out of juniper and other garden stuff" was not without its weight a few generations later, when a purer taste came to prevail. Hampton Court, Chatsworth, and Wooton, and many other of the finest gardens in England, were laid out in Charles II.'s reign; garden structures also began to be erected. Le Notre planted Greenwich and St. James's parks, under the immediate directions of Charles, Versailles being the model, although only at a humble distance. Clipped yew-trees and other Dutch tendencies, scarcely redeemed by the magnificent gates and iron railings now introduced, became the rage in the reign of William and Mary, — "terraced walks, hedges of evergreens, shorn shrubs in boxes, orange and myrtle trees in tubs, being the chief excellences." In 1696 an orangery with a glass roof was erected at Wollaton Hall, Nottinghamshire, said to have been the first structure of the kind in England. These gardens were laid out in the Italian style, with terraces, statues, fountains, and urns, and, next to Chatsworth, they seem to have been the finest in England. With Powis Castle, and some other fine old terraced gardens, they were sacrificed to the rage for improvement ushered in a century later by Kent and Brown, and their followers.

11. The time was, indeed, fast approaching when an entirely new school of art in gardening and laying out grounds was to be initiated. Bacon's criticisms had paved the way, Milton's gorgeous descriptions helped to bring the stiff formality of the French and Dutch styles into disfavour; Addison and Pope, by their ridicule, completed their overthrow. Addison compared your makers of parterres and flower-gardens to epigrammatists and sonneteers; contrivers of bowers and grottos, treillages and cascades, to romance writers; while the gravel-pits at Kensington, then just laid out, were the writers of heroic verse. This ridicule had a very happy effect, and when combined with the imaginings of Milton, and the natural descriptions of scenery by Thompson and Shenstone, and the refined criticism of Pope, Gray, Warton, Whately, and Walpole, and the practical application of the poet's visions by Kent and Mason and their immediate predecessors, had a wonderful effect on English gardens and parks. The gardens of Paradise, as described by

Milton, became the germ of many a palatial garden given up to the tender mercies of the artist. Many a garden emulated that of Eden, which

"Crowns with its enclosure green,
As with a rural mound the champaign head
Of a steep wilderness, whose hairy sides
With thicket overgrown, grotesque and wild,
Access denied * * * * * *"

12. Nor is it at all surprising that this gorgeous picture seized upon the imagination of the more enthusiastic landscape gardeners, roused to exertion by the mixed criticism and ridicule of the leading spirits of the age. The result was the establishment of a new school in art, which, in course of time, came to be recognized as the English style, and which, according to Gray, "is the only taste we can call our own, the only proof we can give of original talent in matters of pleasure."

13. Loudon and Wise were among the earliest innovators, and are highly praised in the "Spectator" for the manner in which they laid out Kensington Gardens. Bridgman followed, hewing down many a verdurous peacock and juniper lion. Kent, the inventor of the ha-ha, followed, and broke up the distinction of garden and park; and Brown (Capability Brown, as he was called) succeeded him with round clumps and boundary belts, artificially winding rivers and lakes, with broad drives terminating in summer-houses. Brown is admitted to have been a man of genius, and astonished the gardening world by the skilful manner in which he arrested the river and formed the beautiful lake at Blenheim; but he could not be everywhere, and he found many ignorant imitators. Sir Walter Scott tells an amusing story of one of these conceited pretenders who was employed by Lord Abercorn in laying out the grounds at Duddingston. The house embraces noble views of Craigmillar Castle on the one side, backed by the Pentlands; on the other, by Arthur's Seat and the Salisbury Crags; and on a third the eye is carried past the precipitous rocks on which stands the Castle of Edinburgh, across the rich plains of Midlothian: the improver conceived it to be his duty to block out every glimpse of this noble landscape. Duddingston Loch is a beautiful piece of water, lying at the foot of Arthur's Seat: he shut out the lake also, and would have done as much for the surrounding hills, but they were too grand objects to be so treated. Lord Abercorn laughed at his absurdities, but was too indolent to interrupt his vagaries.

14. It is not surprising, perhaps, that the opponents of the old style rushed, at a very early period to the opposite extreme; fine old gardens

were recklessly pulled to pieces; in the words of Sir Walter Scott, "Down went many a trophy of old magnificence—court-yard, ornamented enclosure, fosse, avenue, barbican, and every extensive monument of battled wall and flanking tower." Sir Uvedale Price, who went a certain length with the prevailing mania, which he afterwards was still more active in arresting, expresses bitter regret for the destruction of an ancestral garden on the old system which he condemned to destruction before he found out his error. He was afterwards led to write strongly in favour of the preservation of the remains of ancient magnificence still untouched, with modifications calculated to redeem them from the charge of barbarism.

15. "It was, indeed, high time that some one should interfere," continues Sir Walter Scott. "The garden, artificial in its structure, its shelter, its climate, and its soil, which every consideration of taste, beauty, and convenience recommended to be kept near to the mansion, and maintained as its appendage, has by a strange and sweeping sentence of exile been condemned to wear the coarsest and most humbling form." Sir Uvedale Price soon recognized a threefold division of the domain. For the architectural terrace and flower garden, in the direction of the house, he admits the formal style; for the shrubbery or pleasure-ground, a transition between flowers and trees, which he is willing to hand over to the improver; but for the park, which belongs to the picturesque—his own subject—he gives full scope to the most picturesque disposition, provided it is not frittered away in trifling details. This style of laying out, in which the lawn is imperceptibly lost in the distant park, has been called the English style. "Nothing," says Scott, "is more completely the child of art than a garden." Who would clothe such a child in the gipsy garb, however picturesque it may be?

16. Nor was the revolution in gardens confined to this country. The rage for English—or, as the style was sometimes called, the "natural"—style, spread rapidly on the Continent, and especially in France,—of course with variations and individual as well as national idiosyncracies: thus at Ermonville, the seat of Vicomte Girardin, a garden in ruins was considered not out of place with an accompanying band of music, while madame and her daughters walked about as Amazons in black hats, and the young men of the family dressed in imitation of the country people. Another proprietor, M. Watelet, who had written a system of gardening on strictly utilitarian principles, while he adopted the system so far as to erect temples and altars about his grounds, felt himself bound, in consistency, to employ a body of worshippers; to which the Prince de Ligne gave ridiculous *éclat* when he said, in a fit of

enthusiasm, "Go thither, meditate over the inscriptions dictated by taste, meditate there with the wise, sigh with the lover, and bless Watelet."

17. During the present century, this question, which at its commencement was one of chaos, has acquired form and consistency. The distinction which Sir U. Price, Whately, and a host of writers sought to establish and simplify, has been ably continued by Sir Walter Scott, Sir Henry Stewart, Sir Thomas Dick Lauder—the able editor of the last edition of Price's work,—Gilpin, and a host of writers, ably seconded by Repton, and another Gilpin—a professional landscape gardener,—Sir Joseph Paxton, and other well-known practical gardeners; and it is now universally admitted that the garden surrounding the house, whether an architectural terrace or bedded lawn, must of necessity possess uniformity; that the shrubbery immediately adjoining must partake of the same character, somewhat modified; while the more distant portions and the park are willingly abandoned to the landscape gardener—a term, however, to which Sir Walter Scott takes exception.

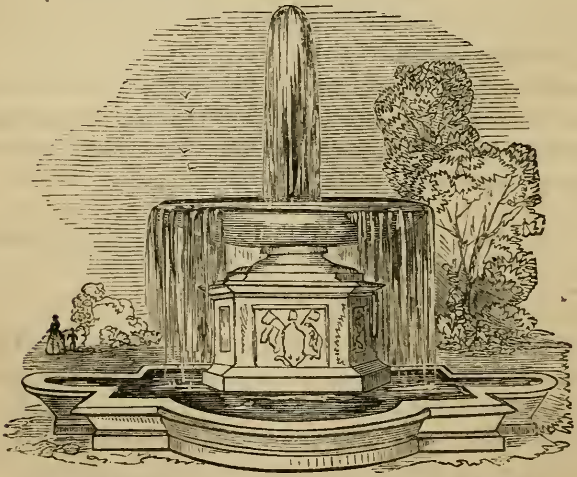
18. Such is a very brief sketch of Palatial Gardening, which is necessarily the parent of all other styles worthy of name. The extent, however, to which the humbler class of gardens have been carried bears testimony how deeply rooted is the taste for flowers and gardening pursuits. While the higher order of gardening was settling down into the refined taste which has produced the ornamental gardens of Chatsworth, Trentham, Alton Towers, and Dalkeith Palace, suburban gardening was also undergoing its own transition. The undoubted taste of Kent, Brown, and Repton was some protection to the places of which they had the immediate charge; but the humbler gardens, brought into form by their ignorant and careless imitators, had no such protection: with them a taste for the fantastic occupied the place which in a previous age had been devoted to the formal; beds of bizarre forms and irregular outline—lady's tresses *en papillotes*, as they have been called—disfigured many a lawn, where—

> "Up and down, carved like an apple tart,
> Here snip, and trip, and cut, and slish and slash,
> Like to a censor in a barber's shop."

This style of arrangement, though still occasionally seen, has given place, like the same evil in more important places, to a purer and more simple style of arranging garden grounds. The kitchen garden is now no longer looked upon as a place forbidden, even to the females of the family, and the beautifully-arranged kitchen gardens at Frogmore, where royalty does not refuse to visit, are proofs that utility is not necessarily unornamental. The cabbage and the onion were not excluded from "the little garden of our ancestors, where they knew every flower because they were few, and every name because they were simple. Their rose-bushes and gilliflowers were dear to them, because themselves pruned, watered, and watched them—had marked from day to day their opening buds, and removed their fading blossoms."

19. Gardens, as we have seen, were carefully cultivated by the Romans; the cottager's garden was the test of his worth as a member of the community; and we shall not be far wrong if we apply a similar test to our own rural population. The garden of the English cottager is, indeed, already remarked as one of our national distinctions; even in the midst of squalor and misery we find an occasional Spitalfields weaver growing auriculas and carnations in the greatest perfection, evincing the universal interest taken in the subject; and it is well-remarked by a Quarterly reviewer, "that when we see a plot set apart for a rose-bush, and a gilliflower, and a carnation, it is enough for us: if the jessamine and the honeysuckle embower the porch without, we may be sure that there is the potato, the cabbage, and the onion for the pot within: if there be not plenty there, at least there is no want; if not happiness, there is the nearest approach to it in this world—content.

"Yes! in the poor man's garden grow
Far more than herbs and flowers,—
Kind thoughts, contentment, peace of mind,
And joy for many hours!"



FOUNTAIN OF THE BELVIDERE COURT OF THE VATICAN.

LANCASTER SANDS.

CHAPTER II.

FORMATION OF NATURAL SOILS.

20. WHOEVER travels in these days of railways and makes use of his eyes, must of necessity be struck, as he careers along between precipitous railway-banks, with the variety of soils and subsoils which present themselves palpably visible to the naked eye. White, red, and blue, pass in rapid succession; soils, sandy and dry, pulverizing readily under tillage, or stiff, wet, and unmanageable, may all be passed in a day's journey. In the absence of more exciting food for thought, the passing traveller, breaking through that indifference which takes all things for granted, may well ask himself whence the great diversity of soils, and what their constituents?

21. The chemist will answer readily enough that they are compounded of a great many chemical substances, and repeat the names of some fourteen, which are present in varying proportions in all fertile soils. The practical cultivator, with equal readiness, reduces them to some five or six well-ascertained varieties of soil, characterized according to the preponderating proportions of silica, lime, clay, vegetable mould, marl, or loam, which they contain; according to his rough estimate,

I. SANDY soils contain 80 per cent., or thereabouts, of silica; that is, of the crumbling débris of granite or sandstone rock.

II. CALCAREOUS soils contain 20 per cent. and upwards of lime in their composition.

III. CLAY soils contain 50 per cent. of stiff unctuous clay.

IV. VEGETABLE mould, the richest of all garden soils, contains from 5 to 12 per cent. of *humus;* that is, decomposed vegetable and animal matter.

V. MARLY soil, is the débris of limestone rock, decomposed and reduced to a paste.

VI. LOAMY soil, in which the proportion of clay varies from 20 to 25 per cent.; sand, and various kinds of alluvium, making up the remainder.

But both chemist and cultivator still confine themselves to generalities. We want to know something more of the origin of soils than we have yet ascertained; for this we must consult the geologist.

22. From him we learn a strange and wonderful chapter in the history of creation. The framework of the globe we inhabit, he tells us, is a dense mass of primitive rock, of igneous origin, which has been proved by fire and tempered by water—vast masses of rugged granite and porphyry towering to the skies in our own and other countries; overlying which are the rocks of secondary formation, in which it is sometimes embedded; but more frequently the shaly slate and old red sandstone are thrown around it in their order of stratification, a mantle, as it were, thrown over the shoulders of these giants of creation.

23. These rocks of secondary formation are distinguished by their colour, and by their structure, but above all by their fossiliferous remains; by means of which the naturalist has been able to trace the history of creation through a vast lapse of ages. These rocks of secondary formation, are:—

24. I. *The Silurian group*, or clay-slate system, a mass of sedimentary rocks, intersected here and there by beds of igneous origin, in the upper series of which are found the first vestiges of organized beings.

25. II. *The Old Red Sandstone*, which can be traced by the naked eye, from the contrast it presents to the grey slate of the Silurian and crystalline masses of the granite rocks, is the next overlying stratum. This difference in colour is the consequence of a change in the beds of ancient seas. During the Silurian epoch, the bed of the sea was occupied by a deposit of blackish mud or clay, the débris of granite rock, decomposed by atmospheric influences and thrown down by the action of the waves. In the Devonian epoch, as the system is sometimes called, from its prevalence in that county, this was succeeded by a sandy deposit, mixed with oxide of iron, to which the red colour is due.

26. III. *The Carboniferous* system, embracing the mountain limestone, rises in many places in close connection with the old red sandstone. The latter prevails to a large extent throughout Scotland and Wales; but if we look to the southern slopes of the mountains, especially in the latter country, they are found to be of another shade; it is the transition between the Devonian and carboniferous era. The carboniferous rocks develop themselves with great boldness in the vast basins of Glamorganshire, in Caernarvon, and in Carmarthenshire, and again in Derbyshire, where they occur in bold and picturesque grandeur, their lofty, pointed, and sometimes fantastic summits melting in the clouds; the picturesque character of this formation, however, being most observable in the *dales* or gorges of the mountains. The limestone, which forms the base of the coal-measures, is exclusively of marine origin, as is made evident by the multitude of marine fossils found there: it also contains the first traces of the terrestrial flora, so abundant in the carboniferous formation, or coal-measures. These vegetable ruins become as common in this as they were rare in the previous formations; they announce immense accessions of dry

land, and a warm, humid, and tropical atmosphere in those islands. The grand *sigillaria* and *stigmaria*, and the arborescent ferns, were the typical vegetation, and everything announces an epoch of immense duration. Professor Phillips calculates that at the present rate of progress, 122,400 years would be required for the accumulation of 60 feet of coal; while the formation in some places is supposed to be upwards of 2,000. It is supposed that, in the upper coal-fields, where bed is heaped upon bed, the produce of ages upon ages, their formation was quiet and progressive; but that towards the end of the period it was marked by great convulsions; the masses of coal were broken, and thrown down in dislocated lines into separate basins, during which we enter on a fourth geological epoch:—

27. IV. *The Permian* system has left few traces in the British islands. It is, however, represented in Yorkshire, Derbyshire, and some other places, by accumulations of dolomite, of which we have examples in the stone used for the new Houses of Parliament. The mountains of the system attain great height, but they are poor in fossils. Various-coloured marls, sandstone, and magnesian limestone, characterize the formations of this epoch; it is a transition period, closing a chapter in the history of the creation, during which the British islands emerged from the great deep, while the inhabitants of the seas, or at least their remains, were elevated to the summits of the highest mountains in some grand convulsion of nature.

28. V. *The New Red Sandstone* is the commencement of a second phase in the geological formation of these islands. In its features it is neither so striking as the old red sandstone, nor has it the bold and rigid aspect of the more primitive granite rocks. It furnishes, however, materials of the highest importance to industrial art. Many of our feudal castles and ruined abbeys were constructed out of its quarries. Its masses have formed the sandy bed of an ancient sea, of less depth than the seas of the preceding epochs; for the traces left by the feet of an animal of the tortoise kind, of gigantic size, in its daily visits to the seashore, have been clearly traced in this formation.

29. VI. *The Oolite* formation originates in the muddy deposit made in a calm sea. In the grand masses of rock of which it consists, were found the ichthyosaurus and other gigantic animals of wonderful structure—dragons of fearful form, which the imagination of man had failed to characterize. From Yorkshire on the north-east, to Dorsetshire on the south-west, this formation extends across England, a system of rocks nearly 30 miles in breadth, which give a peculiar profile to the country. The slopes are gentle, as compared with any of the previous formations; the valleys are intersected by brooks and small rivers, and clothed in richest vegetation; but the landscape is tame as compared with that of the limestone or sandstone mountains. The scenery no longer surprises, it only pleases; and its quarries furnish a beautiful building material, as in the Bath and Portland stone.

30. The isle of Portland, off the Dorset coast, rises to a considerable height above the level of the sea, and presents, on the side of the port, a perfect citadel of reefs; on the west a line of round pebbles, flints, and moveable

shingle, forms a desolate hillock, extending seventeen miles along the coast, without herb, house, or tree, but with inner waters and beach. This barren waste—the Chesil bank—connects the isle with the mainland. The quarries, of which there are at least fifty, occupy the north side of the island. The upper beds of the oolite are here of a sombre yellowish colour; it is burnt for chalk. The next bed is a whiter stone, more pleasing to the eye; it is the stone of which the portico of St. Paul's is built. In these quarries we find examples of the great changes to which the globe has been subjected. The stratum of building-stone contains organic *débris* exclusively marine. Upon this stratum rests a bed of limestone, formed by lacustrine waters, and again over this a bed of bluish substance, supposed to have been an ancient vegetable soil, which the miners call the *dirt-bed.* Here are trees and tropical plants silicified, the ruins of a forest resting on the ruins of an ocean. The trunks of the trees are often standing erect; they even seem to have been petrified while growing. It is supposed that the region now occupied by the narrow strait and the neighbouring coast, had been a sea, in the bed of which the oolite deposits, which produce the stone, had accumulated; that the bed of the sea had been gradually raised, until it emerged into light; plants began to grow on the newly elevated soil, and their spoils have formed the *dirt-bed.* This vegetable soil, with the trees which grew on its free surface, was afterwards engulfed in the waters—not the bitter waters of the ocean, but in the fresh waters of a lake at the mouth of some great river. Time passes on, and an alluvial soil deposited by the river covers the *dirt-bed.* At length, some great convulsion occurs, all the region is engulfed anew, and thrown to the bottom of an abyss, where, after ages of successive change, the isle of Portland has again risen out of the sea.

31. VII. *The Cretaceous,* or *Chalk formation,* comprises green sands, chalk, marl, and flint, among its constituents. It is conspicuous in the eastern and southern counties of England; it is the base on which rests the great tertiary deposits of the London basin and the Wealden clay, and spreads over wide areas in France and Germany.

32. If we traverse England in an easterly direction, from Yorkshire to the extremity of Kent, a totally different outline characterizes the plains and mountains, the colour of the rocks, and the character of the vegetation. Long ridges, having the appearance of coasts, may be traced in the interior of the country, with their rounded headlands, and capes heaped behind capes; at their foot stretch out undulating plains, richly wooded, clothed with herbage or with golden crops of richest cereals. Occasionally valleys are hollowed out without watercourses, the heights and downs on either hand, which seem to rise and fall like the sea after a tempest, their summits often more or less denuded, their white and tempest-torn surface contrasting strangely with the red and broken rocks with which they are sometimes surrounded. In Oxfordshire, the Chiltern Hundred are hills presenting this aspect. These chalky hills were formerly covered with beeches. In Hampshire, a small chalk hill may still be seen at Selborne, from which flow two small courses—a fountain and a brook—

described by its amiable and well-known historian White. In the county of Kent, hundreds of similar scenes maintain its character for beautiful scenery and richly productive soil. Nearer to the great metropolis, if the reader will accompany us a few miles down the North-Western Railway, a rapid ride and a rural walk will place us in the centre of one of these formations. The scene is Harrow—Harrow on the Hill—the cherished *Alma mater* of poets and statesmen, itself an isolated tertiary formation. Leaving the railway at this station and crossing it by the Pinner Drive, the road leads through a rural farmyard. Beyond the farmyard the path crosses stiles and upland fields, each of which exhibits, more plainly than the last, the shelving bottom of a retiring sea terminating abruptly in a jutting headland beyond which the path descends abruptly to the village of Pinner. How were these prodigious heaps of chalk and other earthy hillocks formed, which give character to our coast and support the soil of so large a portion of its surface? We have still before us the bed of an ancient sea; imagine the lowest depths of the Atlantic Ocean—the Atlantidæ of Plato, which Lyell is ready to believe in—raised to the level of its surface, and its shallower parts would be a series of hill and dale not unlike the scenes we have been describing. The chalk is partly of animal origin; each molecule of these immense masses has formerly circulated in the veins of organized beings, or formed some plant which grew and multiplied in the depths of these cretaceous seas. They were microscopic shells so minute that Ehrenberg calculates that a cubic inch contained 10,000 individuals. Besides this animal deposit, the chalk hills of Kent contain innumerable flints deposited in parallel beds, often associated with flattened silica, which is extensively employed in the manufacture of porcelain.

33. The tertiary formation, which forms another great chapter in the history of creation, is the flesh which covers the bony skeleton, and belongs more properly to our subject; namely, the formation of soils. The lower strata compressed by pressure into solid rock; the upper portions, the loose soil thrown on the surface, consist of loosely-arranged beds of marine and fresh-water origin; having none of the grand characteristics which distinguish all the previous formations; but, in their place, we have the softened horizon, the rich plains, and smiling hills of a more civilizing landscape. To the earlier geologists the tertiary formation was a mere chaos of superficial deposits, which seemed to have no connection with any distinct epoch; but the researches of Sir Charles Lyell and the recent geologists have caused light to shine on this darkness. Before them, to borrow Addison's beautiful allegory, geology was a bridge, spanning the waters of eternity, of which a thick cloud covered the first and last arch. In our day, the cloud is torn asunder, and the great secret of ancient nature revealed, by the study of shells—medals struck as records of the temperature of the globe. Sir Charles Lyell has deciphered this last chapter of an obscure history, dividing it into, —1. Lower Tertiaries, or Eocene; 2. the Middle Tertiaries, or Miocene; and, 3. Recent Tertiaries, or Pliocene; each distinguished by its fossiliferous deposits.

34. At the commencement of the tertiary epoch of geology, there is every reason to believe that the British islands were merely a long straggling archipelago of rocky pinnacles, rising out of the great deep; and a geological map of the period may readily be constructed by laying under water every part of the country which does not rise 800 feet above the level of the sea. Taking the whole range of the country, it will be found that it is rugged and mountainous on the west, north-west, and south-west; extensive elevations, intermingling with valleys, dales, and intersected by rivers and plains much more extensive at the central, eastern, and south-eastern parts.

35. Commencing at Cape Wrath, an uninterrupted range of granite mountains, with groups of Silurian formation and sandstone groups, in some places rising perpendicularly out of the sea to a great height, occupy the west coast, culminating at Fort William, in Ben Nevis, where it is met by the mighty Grampians, the principal range of which, commencing a little to the east of Aberdeen, stretches across the country from east to west, culminating in Cairngorm and Ben Muic-dhu, the loftiest mountain in the island. The spurs of these two mountain-ranges occupy pretty nearly the whole angle formed between Cape Wrath and the most easterly of the Grampians, while, on the south, it extends as far as Ben Lomond on the west, and the Ochill Hills on the east. A broad valley, formed by the Forth and Clyde, and other watercourses, which even now nearly intersect the country, was still an ocean-bed; but, to the south, the Pentlands just raised their heads above the water, and formed, with the Lammermoor Hills, Blackhope Scaurs, Lothian Head, and the Liddlesdale and Cheviot range, a small archipelago by themselves. South of the Tyne rose what has been called the Pennine chain, which includes Crossfell, Wharnside, and Holme Moss, terminating at the Weaver Hills, in Staffordshire. This long range occupies the centre of the country for about 170 miles; while the Cumbrian group forms a quadrangular range nearly united with it for a considerable part of the distance, and may be considered the central range,—the backbone, as it were, of the country.

36. A little to the south of the Weaver Hills, and considerably to the west, rising abruptly out of the sea, at Anglesea Bay, the British Alps, or Cambrian mountain-system, including the loftiest mountains of South Britain, commences. These extend their spurs over the whole west coast between the Bristol Channel and the island of Anglesea, and far into the interior of the country, gradually losing themselves in the Wrekin, in the plains of Salop and the table-land which extends between Nottingham, Birmingham, and Northampton. A few isolated groups of hills, as the Malvern Hills, the Cotswold Hills, the Cleave Hills, Inkpen Beacon, and some of the loftier of the South Downs, would just rise above the waters; but the whole of the east coast, to the foot of the hills named, now known as the eastern plains of England, of an elevation less than 800 feet, would, at the commencement of the tertian epoch, be under water, and in course of formation, as well as the whole of the south and west coasts, except the high lands round Dartmoor and the Cornish hills.

37. Such is a brief sketch of the geological condition of the British islands at the beginning of the tertiary formation; for the picturesque dales, and beautiful valleys, and rolling and undulating plains, which give beauty and variety to the country, were as yet at the bottom of the ocean, which swept the base of the mountain-ranges or lacustrine beds confined to the bosom of the mountains from which they had not as yet forced a passage. Undulating plains of verdure have succeeded to the ocean-wave. The rugged rocks of secondary formation, which now give character to the landscape, were still washed by it.

38. The agencies which have operated in the greatest degree in producing these changes, are *chemical* and *mechanical.* The great *chemical* agent is atmospheric oxygen, for which many of the mineral elements possess a powerful affinity. Rocks have been broken up, and whole masses of them have crumbled into small fragments, which, by means of further accessions of oxygen, have finally crumbled into dust.

39. Again, carbonic acid, contained in great abundance in rain-water, has a powerful influence in dissolving the carbonate of lime present in limestone rocks: where a considerable proportion of clay is present, it crumbles into powder, furnishing what is known as marly soil. Even on felspars, granite, and other crystalline minerals, water exercises a highly-important action, decomposing them into alkaline silicates, yielding, in their turn, silica and carbonate of potash, and silicate of alumina,—the chief constituents of clay; in other words, clay is produced; and highly-fertilizing alkaline salts, which exist in these minerals, are changed into easily-soluble carbonates, which are thus rendered available for the immediate food of plants.

40. Plants and animals also take an active part in this disintegration of rocks. In the celebrated experiment of Von Helmont he planted a willow-tree weighing five pounds, in two hundred pounds of earth previously dried in an oven. After an interval of five years he pulled up the willow and found that its weight had increased to a hundred and sixty-three pounds three ounces. During the five years the earth had been duly watered with rain-water; but in order to protect it from any foreign admixture of soil, a piece of tin plate was laid on its surface, pierced with small holes; the leaves, which fell annually, were not included in the weight. The earth was oven-dried and weighed, and was found to have lost only about two ounces of its original weight. Thus, according to Von Helmont, a hundred and sixty-three pounds of wood, and all the leaves of five years' growth, had been produced from water alone. Von Helmont's idea was that water generated earth, which is altogether fallacious; but the experiment is a valuable illustration of the power which vegetables have of decomposing carbonic acid and absorbing carbon. Subsequent experiments demonstrate the possibility of certain vegetables deriving the whole of the carbon necessary to their existence from water alone.* Besides this, seeds of lichens and mosses floating in the air at last attach themselves to the

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* "Handy-book of the Chemistry of Soils."

rough and partially decomposed surface of the rocks, and, finding here sufficient food, germinate, and throw out roots, which penetrate into the crevices of the rocks like wedges, widening and separating them, and hastening their decomposition; for in their roots they retain the water, which finally acts upon them by its dissolving powers. Insects come to feed upon the mosses and lichens, and, finally, both die, leaving the rocky matter, originally purely mineral, a mixture of animal, vegetable, and mineral remains, or humus. A thin layer of fertile soil is thus formed, on which plants of a higher order spring up, all tending to produce the mighty results we have hinted at.

41. Wind, water,—above all gravitation, are the more *mechanical* agents in the disintegration of rocks. Water, aided by the tempest, having washed away all the softer supports of a mass of rock, this, in obedience to this irresistible law, soon falls, contributing its mass to fill up the valley below, the rocks being reduced in their fall to smaller pieces; and, finally, obedient to the chemical laws, they crumble to dust, more or less rapidly, according to their nature and the atmospheric influences.

42. Water, which thus acts as a chemical agent in destroying rocks, is also strong in its physical force. As falling rain, it washes down all loose particles into some river-bed, which again carries down the finer particles, held in suspension, till deposited in the delta, to form, at some future day, a field, a district, or a new country, as the case may be—rescued from the flood. Again, in the earlier geological epochs, when a vast portion of the earth was the bed of ocean, it may be imagined with what force the waves dashed against opposing granite rock. The chemical action was already at work, decomposing the crystalline fabric; while the waves, by their abrasive powers, were grinding and depositing the dark mass, which was to emerge, in due time, in the form of the slaty shale of the Silurian system. The action of the waves and the winds on the stratified rock is still more intelligible; accordingly, we find that the London clay, embedded over the chalk to the depth of 700 feet, consists of layers of clay, of sand, and of gravel, sometimes marine and sometimes fresh-water deposits, as the geologist easily learns by studying its fossil remains, which present every kind of vegetation, from the tropical cocoa-nut and acacia to the walnut-tree; indicating that the country had passed from a tropical sun at one period to another extreme, when there is every indication that the temperature was that of the frozen zone. There were also shallow seas and lakes at the tropical period, when groves of palm-trees existed, under whose shade tortoises basked; and rivers which swarmed with crocodiles, and forests in which the elephant and other tropical animals ranged; while the group of isolated islands became gradually united into small continents, and the rocks into islands, probably with small inland seas and lakes in their bosom.

43. As might be expected under these circumstances, when we come to inspect minutely the soil of any garden or field, it will be found to contain,—1. stones, sand, or gravel, in larger or smaller masses; 2. a lighter mass of friable soil, crumbling into dust between finger and thumb, and, when put in

water, rendering it muddy ; 3. organic matter, that is, vegetable and animal remains, or humus.

44. A closer, or chemical examination, requires that a fair sample of the soil should be soaked in a glazed earthen basin, filled with rain or distilled water, agitating it occasionally, so as to break any hard lumps of earth. Where it is hard clay, rub the soil in a mortar with the pestle, adding water from time to time till dissolved. Allow the whole to remain undisturbed for a few minutes, when the sand, stony fragments, and organic matter, will fall to the bottom, by reason of their specific gravity ; the finer particles floating on the water. This muddy water is to be poured off into a glass vessel, and the deposit left washed repeatedly in clean water, till it comes off perfectly pure. The residuum is reserved for further examination.

45. The muddy water poured off first is suffered to remain at rest in the vessel till the fine mud has quite settled at the bottom, and the water is perfectly clean, when it is poured off also, and the water left to dry by evaporation, in an earthen or porcelain vessel.

46. The sand and gravel, the mud, and the residue of the pure liquid, into which the soil has been separated, are mixed with organic matter. We can, therefore, only separate the soluble from insoluble matter, and the finer vegetable remains from the larger pieces of roots and stems. The soluble organic matter remains in solution, the finer portions with the mud, and the coarser with the gravel and sand. By heating a portion to red heat, in an iron spoon or platinum dish, the organic matter will first blacken the soil and then disappear entirely ; when the heat is continued some time and increased, the incombustible matter being left behind, is generally coloured red by the oxide of iron, which is present in every soil. The organic part which burns is called the combustible part. Thus:—1. stony fragments ; 2. impalpable powder ; 3. soluble organic and inorganic matter, are obtained by the washing process.

47. The sand and gravel vary much in character, partaking of the rocks from which they emanate.

48. The impalpable powder will be found a mixture of clay, with very fine fragments of stone and gravel, and organic matter. In it the chemist will distinguish alumina combined with silica, free alumina, free silica ; oxide of iron, of manganese, of lime, of magnesia, of potash, and soda ; with traces of phosphorus, sulphuric and carbonic acid ; silica, or sand, predominating.

49. Organic matter is recognized by the black colour the powder assumes when heated over a spirit-lamp. The watery solution evaporated to dryness, leaves an inconsiderable residue, generally coloured brown by organic matter, which may be drawn off by heat. In the combustible residue, chemical tests will generally discover ammonia, humic, ulmic, cremic, and apocrenic acids, all known under the common name of humus. In the incombustible, potash, soda, lime, magnesia, phosphoric acid, sulphuric acid, silicic acid, chlorine, and occasionally oxide of iron and manganese will be found, with nitre, iodine, and bromine ; this latter, however, of very rare occurrence, and only in soils near the sea or near to salt-springs.

50. All cultivated soils contain the above ingredients. When burnt, except in the case of chalk, they assume a red colour, which is due to the presence of iron-stone. Out of this apparent sameness arise the greatest varieties of soils, from their proportionate admixture, and, especially, from the proportions of organic matter with which these chemical constituents are mixed.

51. Of this organic matter rich black garden soils often contain from 20 to 24 per cent. by weight, and in peaty soils it often amounts to from 60 to 70 per cent.; in good garden land it may range from 5 to 12; and in good agricultural soils, seldom more than 6 per cent. This organic matter, so essential to soils, is chiefly of vegetable origin,—the roots and stems of former crops, with a mixture of animal refuse. Decomposed under the influence of air, heat, and water, they produce the brownish or blackish powdery substance known to the chemist and scientific gardener as humus. Humus exists in marly soils in which lime to the extent of 5 per cent. is present, and loamy soils in which clay to the extent of from 25 to 50 per cent. is present.

52. Having thus briefly sketched the history of the formation of soils, and their chemical constituents, let us take an equally rapid glance at the processes by which these proportions can be ascertained.

53. The practical analysis of the soil, washed and purified as described at par. 44, will be as follows:—Any lime existing in the solution can readily be precipitated by the application of sulphuric acid, by which carbonic acid is liberated, and the soluble heavy body—sulphate of lime or gypsum—remains. Magnesia, which exists in all soils, and sometimes to an injurious extent, is precipitated when treated with hydrochloric acid; carbonic acid is thus evolved, and, by the addition of sulphuric acid, sulphate of magnesia, or Epsom salts, are precipitated, the amount being determined by washing, drying, and weighing the resulting sulphate. Silica and clay will probably be the chief remaining ingredients in the solution: when dried, they are exposed to a red heat in a platinum or porcelain crucible, noting the loss sustained in drying.* When ignited and cooled, a portion is weighed out accurately, triturated in a mortar of agate or Wedgwood stone, with about four times its weight of pure carbonate of soda, the whole mixture being transferred to a crucible of platinum, and exposed to a red heat for fifteen minutes. When cold, put the crucible and its contents into a porcelain evaporating-basin; add water and hydrochloric acid, and leave the whole at rest for some time;—the contents will gradually loosen and become dissolved. The solution will probably exhibit floating gelatinous particles: this is silica in combination with water, or hydrate of silica. When evaporated to dryness, but at a low temperature, a little hydrochloric acid is to be added, heat applied for a short time, and the whole filtered; the silica is retained on the filtering-paper, the alumina has passed through in solution. After evaporation, wash the filter copiously with hot water, until a single drop of the water, caught on a slip of glass, no longer leaves a residuum when heat is applied. Hartshorn is now applied

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* Dr. Scoffern's "Handy-book of the Chemistry of Soils." Bell & Daldy.

to the filtered solution; the precipitate is aluminum in combination with water; and, if iron is present, it will be precipitated in the state of red oxide along with the alumina, which is to be evaporated and collected also on a filter, and the filtering-paper carefully washed as before.

54. Having weighed each of the filtrates, the filters themselves and the crucibles are to be carefully dried, and finally severally ignited in a platinum crucible, and the amount of ashes yielded by the filter deducted in each case from the aggregate weight of the filter and precipitates; but if iron is present, it will be necessary first to separate the iron from the alumina by adding to the last filtrate a solution of caustic potash, which dissolves the alumina, leaving the oxide of iron untouched. This is to be accurately collected, washed by a process of decantation, and heated to a red heat, cooled, and weighed; while the alumina, which we left dissolved in potash, is to be treated with the nitrate of ammonia, boiled, and collected by filtration, heated to redness, and finally weighed.

55. Soils, it is evident, are due to the disintegration of the solid rock, which has been going on for thousands of years; in the course of which time the surface of the country has thus been covered by a coating of disintegrated rock, varying in depth and in character with the mineral nature of the neighbourhood. Sandstone has produced a light, porous, sandy soil; slaty shale has yielded a stiff, cold, impervious clay; from the crumbling limestone a calcareous soil has been formed; and the trap-rock of the primitive formation has yielded a rich, fertile, and generally reddish-grey loam. Basalt rock, which prevails over great part of Scotland and the north of Ireland, and here and there in England, gives a friable fertile soil, also of reddish-grey; while the soils resting on the chalk formation generally partake of a dry, loose, friable character, congenial to many of the most useful forms of vegetation. While useful to the gardener, an intimate knowledge of the characters of these soils is essential to the farmer. To a large extent, the gardener, operating on a limited scale, can prepare his soils, and ameliorate their nature, by rule-of-thumb admixture, and by the use of humus, or vegetable mould, the product of decomposed animal and vegetable manures. Of all the constituents we have named, humus performs the most important part in the direct food for the nutrition of plants; but whether it combines with organic matter and forms plant, or whether it only exercises a beneficial influence on vegetation by furnishing a continual source of carbonic acid by its decomposition, or by condensing ammoniac gas from the atmosphere, is by no means a settled question, the best chemists differing widely on the point; some of them denying altogether the efficacy of inorganic matter in soils. Recent experiments, however, show distinctly the great influences that inorganic matter exercises over the growth of plants: it is taken up by the roots, and may be traced in the ashes of plants; and it has been most satisfactorily proved, that organic matter alone is incapable of supplying all the wants of the growing plant, certain inorganic substances being required by every plant, which, if not present in the soil, there is a barrier to its healthy growth. There can be no

doubt that humus supplies plants with an essential part of their food; but it acts in various ways, which, as we have said, are not very clearly ascertained.

56. All fertile soils thus contain, besides organic matter, a determinate quantity of ten or eleven chemical substances; namely,—1. Potash. 2. Soda. 3. Lime. 4. Magnesia. 5. Alumina. 6. Iron. 7. Manganese. 8. Silica. 9. Sulphur. 10. Phosphorus. 11. Chlorine.

57. *Potash* is obtained from burning wood, small branches, or leaves, the ash being washed in water, and evaporated in an iron pot and calcined. Add a small quantity of water, decant the liquid, and evaporate to dryness, and pearl-ash is obtained, which is an impure form of potash in combination with carbonic acid, or crude carbonate of potash. When this is boiled with newly-slaked quick-lime, it is deprived of carbonic acid, which enters into combination with the lime, and the carbonate of potash is thus converted into pure or caustic potash, which can be separated into a silvery-white, soft, metallic substance,—potassium, and a gaseous element,—oxygen. Many plants require a large amount of potash for their food, the only source from which it can be obtained being the soil. This accounts for the fact that wood ashes, which contain carbonate of potash, are so conducive to the healthy growth of clover, beans, peas, potatoes, and other plants whose ashes yield potash in return. The combination in which potash is found in soils is chiefly as silicates of potash. Some kinds of felspar, mica, and granite, contain large proportions, as much as 15 to 20 per cent. It also enters into the composition of trap-rock, basalt, and whinstone, though in smaller proportions. As the rock crumbles, silicates of potash are set free, and rendered available for the plants. Clay, which is chiefly derived from felspar, invariably contains it; and it is partly for this reason that light land, in which potash is usually deficient, is benefited by claying.

58. *Soda* is obtained by burning seaweed; and plants growing on the sea-shore, are rendered caustic by the same process. Its most common form, however, is sea-salt, or chloride of sodium. Seakale, asparagus, and similar plants, are benefited by its use.

59. *Lime.*—Chalk, marble, and limestone, are carbonates of lime. Under heat, the carbonic acid is driven out, and pure or caustic lime remains. In its effects on animal and vegetable matters it resembles potash and soda, is slower in action, and is used most beneficially on peat land: its excess of organic matter is thus gradually destroyed, and converted into nutritious food for plants. Quick-lime sprinkled with water absorbs it; heat is evolved, and it falls to powder, or is slaked. Slaked lime is a white powder, dry to appearance, but contains, in reality, water in an invisible form, chemically combined with lime. If exposed to the air, it attracts carbonic acid from the atmosphere, and becomes partially changed into carbonate of lime. Salts of lime are found in all ashes of plants; soils, therefore, capable of sustaining vegetable life, must contain lime in some form or other.

60. *Magnesia* is never wanting in fertile soils. Magnesian limestone, which is a natural compound of the carbonates of lime and magnesia, contains 30 to 40 per cent.; and in this form it exists in all dolomite and many other solid rocks. Soils containing much carbonate of magnesia absorb moisture with great avidity, and are generally cold soils. Silicate of magnesia enters largely into the composition of serpentine rocks. Soapstone and limestone frequently contain it. Compounds of sulphuric acid and muriatic acid with magnesia are also found in many mineral waters. Sulphate of magnesia, which is the name of the familiar Epsom salts, is formed from the decomposition of dolomitic rocks.

61. *Alumina* is the compound of a metal,—aluminum, with oxygen, which occurs very abundantly in the mineral kingdom, both free and in combination with acids. In its crystallized state it forms the precious stones, sapphires and

rubies; in an uncrystallized state it is a white, tasteless, powdery substance, obtained by adding a solution of carbonate of soda to alum. It constitutes a large proportion of shale and slate rocks, and is a principal ingredient, in combination with silica, in pipe, porcelain, and agricultural clays, to which it gives tenacity and stiffness. It is rarely found in the ashes of plants, and therefore not considered as directly contributing to their nourishment, although useful as a mechanical agent in absorbing ammonia from the atmosphere, and in detaining the volatile as well as the alkaline salts of manures, which would otherwise be dissolved by the first heavy shower, and carried into the subsoil beyond the reach of the roots of the plant.

62. *Iron,* both in the black or protoxide, and the red or peroxide state, abounds in all soils, the red being most abundant, and easily observable from the red colour it communicates. Even soils in which the protoxide obtains, which are of a bluish-grey colour when brought to the surface, are changed to the red colour by the atmosphere, oxygen uniting with and acting on it. Oxide of iron is found in the ashes of all plants and in the blood of animals. The presence of iron is easily detected in soils by the ochry deposits in the beds of springs and ditches, where the oxide dissolved in carbonic acid produces the metallic-coloured deposit in question. Sulphate of iron also occurs in some soils, produced from iron pyrites: such soils are unproductive; for it is a compound of sulphuric acid with protoxide of iron, better known under the name of green vitriol. Lime added to such soils combines with the sulphuric acid, forming gypsum; and sweetens them and removes the injurious properties.

63. *Manganese* is a metal, which, in combination with oxygen, associated with oxide of iron, occurs naturally in many soils. In the ashes of plants traces of it are also found; but iron usually predominates. The ash of the horse chestnut and oak bark is rich in manganese, with no trace of iron.

64. *Silica,* or *Silex,* occurs abundantly in nature, either in a free state or in the form of sand, sandstones, flint, chalcedony, rock-crystal, or quartz, and in combination with lime, magnesia, iron, potash, soda, and other minerals. Silica is insoluble in hot or cold water, and resists the action of some strong acids; but hydrofluoric acid dissolves it, when mixed with soda or potash, and exposed to the heat of a glass-furnace. Silica is dissolved, or rather enters into combination with the alkali, and forms glass; or when the alkali is in excess, it dissolves into water. On the addition of muriatic acid, or sulphuric acid, to a solution of this silicate of potash, the silica separates into a gelatinous mass, in which form it is soluble in water, and thus becomes the food of plants.

65. *Sulphur,* in the form of sulphuric acid, enters into the composition of all cultivated soils, chiefly in combination with limestone, magnesia, potash, and other bases. With hydrogen it forms sulphuretted hydrogen, a remarkably disagreeable-smelling gas, the product of the decomposition of organic matter contained in the soil and impregnating many medicinal waters, as at Harrogate.

66. *Phosphorus* is a soft, wax-like, highly-inflammable substance, which combines with atmospheric oxygen, giving rise to phosphoric acid, which enters into the composition of all our cultivated plants, and is essentially necessary to a healthy condition of vegetable life. It exists in trap-rock, granite, basalt, and other igneous rocks, and in lime, ironstone, and most minerals.

67. *Chlorine* is a highly-noxious, suffocating, yellowish, gaseous element, particularly disagreeable in smell. In soils it is found in combination with such bases as chloride of sodium, or common salt.

68. Soils, then, consist of a mechanical mixture of four substances,—1. Silica, silicious sand, or gravel; 2. Clay; 3. Lime; 4. Humus, and many of the chemical substances we have described, in varying proportions. Hazel

loam, brown loam, clayey loam, fat soil, sandy soil, garden mould, which are continually spoken of by the gardener, have no specific proportions in themselves, and yet on those proportions their fertility and capabilities depend.

69. Sandy soils are loose, friable, open, and dry, and for that reason easily cultivated. They rest chiefly on the old red sandstone, and granite and coal formations. When alumina and calcareous matter are absent, however, they are nearly barren: they absorb manures without benefit to the land. Where alumina and lime exist, they are more compact and adhesive, and grow good crops of beans, peas, spring wheat, and turnips. They are capable of improvement by admixture with clay, marl, chalk, and other adhesive soils, which communicate their constituent properties to them.

70. Calcareous soils resting on the upper chalk formation are usually deep, dry, loose, friable, and fertile in their nature; but others, resting on the shaly oolite, are stony, poor, thin soils. Leguminous plants, as peas, beans, vetches, sainfoin, and clover, do well on such soils, lime being essential to their growth. Where pure clay is present in such soils, they are called loams or calcareous clays; where silica is in excess, they are termed calcareous sandy soils.

71. Clay soils are characterized by stiffness, impenetrability, great power of absorbing and retaining moisture, and great specific gravity; they are, consequently, cold, stiff, heavy, and impervious, costly to cultivate, and often unproductive. Perfect drainage, burning the soil with wood fagots, branches of trees, grass sods, and vegetable refuse, and mixing chalk and sand, are the only remedies. Burning is the most efficient remedy; the burnt clay acting chemically as a manure, its constituents being rendered more soluble. Provided a moderate heat has been applied to the process, the potash is rendered soluble, and liberated from the clay in which it occurs in an insoluble combination. Thus treated, clay soils become the most fertile for all heavy crops.

72. It will be obvious to the reader that the process of analysis involves more minuteness of detail in carrying it out than we can here enter into. Dr. Scoffern's book, however, is very practical, and enters into all these details in a manner which any intelligent gardener may easily follow.

73. In the absence of a geological or chemical knowledge of soils, many practical gardeners attach great importance to the vegetable products they throw up spontaneously, in the form of weeds, as an index to their nature and quality. The late Mr. Loudon has recorded, in his laborious work, a sort of vegetable index to soils based on this idea.

74. The leading soils for the cultivator are the clayey, calcareous, sandy, ferruginous, peaty, saline, moist or aquatic, and dry.

ARGILLACEOUS.—Tussilago Farfara; Potentilla Anserina, argentea, and reptans; Thalictrum flavum; Carex, many species; Juncus, various species; Orobus tuberosus; Lotus major and corniculatus; Saponaria officinalis. But the coltsfoot Tussilago Farfara is a certain and universal sign of an argillaceous soil, and is the chief plant found on the alum-grounds of Britain, France, and Italy.

CALCAREOUS.—Veronica spicata; Galium pusillum; Lithospermum officinale, and purpuro-cæruleum; Campanula glomerata and hybrida; Phyteuma orbiculare; Verbascum Lychnitis; Viburnum Lantana; Berberis vulgaris; Cistus Helianthemum; Anemone pulsatilla; Clematis Vitalba; Hedysarum Onobrychis.

Silicious.—Veronica triphyllos and verna; Echium italicum; Herniaria glabra and hirsuta; Silene anglica, and other species; Arenaria rubra, Spergula arvensis; Papaver hybridum; Argemone, &c.

Ferruginous.—Rumex Acetosa and Acetosella; Sheep's sorrel.

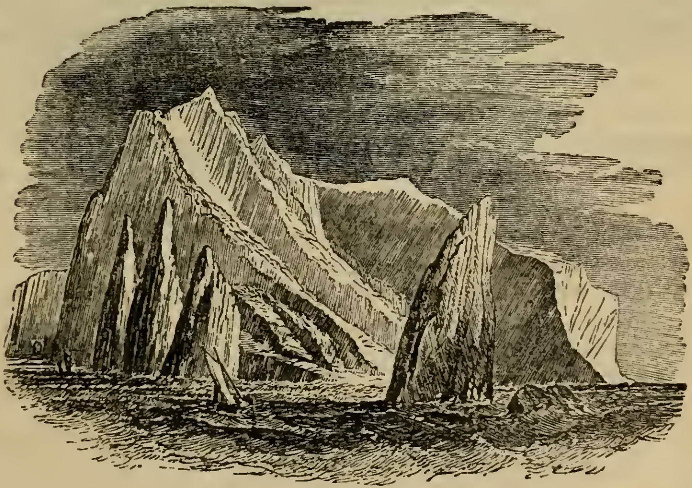
Peaty.—Vaccinium Myrtillus, uliginosum, and Oxycoccus palustris; Ericas, Spergula subulata; Tormentilla officinalis.

Saline.—Salicornia, 4 species; Zostera marina; Ruppia maritima; Pulmonaria maritima; Calystagia; Soldanella; Illecebrum verticillatum; Chenopodium maritimum, Salsola Kali and fruticosa; Sisum verticillatum; Arenaria maritima, &c.; Atriplex laciniata.

Aquatic.—Caltha palustris; Hippuris vulgaris; Pinguicula vulgaris; Lycopus europæus; Valeriana dioica; Hottonia palustris; Samolus Valerandi; Thysselinum palustre; Epilobium tetragonum; Lythrum Salicaria; Ranunculus Lingua and Flammula.

Very Dry. — Arenaria rubra; Rumex Acetosella; Thymus Serpyllum; Acynos vulgaris; Trifolium arvense.

75. This index is not absolutely to be depended on, however, even in Britain; and in other countries they are sometimes found in soils directly opposite; still, the Sainfoin is almost always an indication of a calcareous soil, the common Coltsfoot of blue clay, the Arenaria rubra of poor sand, the small Wood-sorrel of the presence of iron, &c. It would be wise, however, to get the opinion of both scientific and practical men before finally deciding such an important matter. A successful cultivator, who might not be able to give a correct definition to the character of the soil, is generally the safest of all judges as to its quality.



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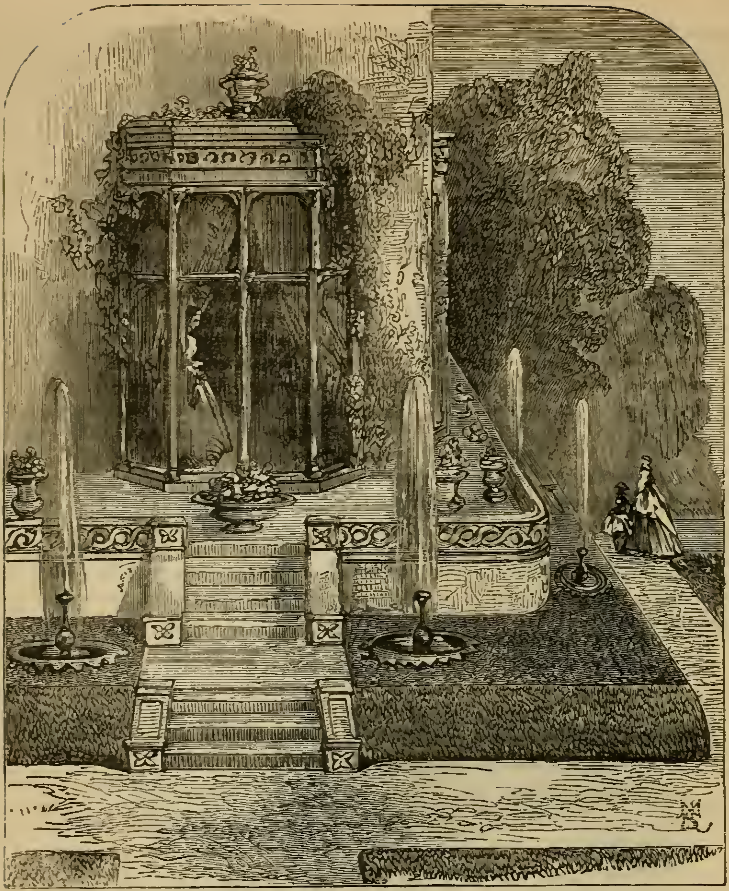


CHAPTER III.

ON THE CHOICE OF A GARDEN SITE.

76. Let us seat ourselves at the feet of Milton, and learn of him what constitutes a desirable site for a house and garden :—He will lead us

> " Where delicious Paradise,
> Now nearer, crowns with her enclosure green,
> As with a rural mound, the champaign head
> Of a steep wilderness, whose hairy sides
> With thicket overgrown, grotesque and wild,
> Access denied."

It is approached by an avenue, which would be considered the perfection of Nature in landscape gardening, from its "great capabilities."

"Over head up grew
Insuperable height of loftiest shade,
Cedar, and pine, and fir, and branching palm,
A sylvan scene; and as the ranks ascend,
Shade above shade, a woody theatre
Of stateliest view. Yet higher than their tops
The verdurous wall of Paradise up-sprung:
Which to our general sire gave prospect large
Into his nether empire neighbouring round;
And higher than that wall a circling row
Of goodliest trees, loaden with fairest fruit,
Blossoms and fruit at once, of golden hue,
Appear'd with gay enamel'd colours mix'd."

This is followed by a vivid description of the interior, such as taste and genius may emulate, for it paints in "thoughts that breathe and words that burn," an epitome of the art of landscape gardening. Earth, air, and water are all operated upon and made subservient to the development of the highest amount of beauty. Sight, smell, taste, in turn partake of its charms.

"Southward through Eden went a river large
Nor changed his course, but through the shaggy hill
Pass'd underneath ingulf'd; for God had thrown
That mountain as his garden mould, high raised
Upon the rapid current, which through veins
Of porous earth with kindly thirst up-drawn,
Rose a fresh fountain, and with many a rill
Water'd the garden; thence united fell
Down the steep glade, and met the nether flood,
Which from his darksome passage now appears."

From this gorgeous scene Art is called upon to tell how

"From that sapphire fount, the crisped brooks,
Rolling on orient pearl and sands of gold,
With mazy error under pendent shades
Ran nectar, visiting each plant, and fed
Flowers worthy of Paradise, which not nice art
In beds and curious knots, but nature boon
Pour'd forth profuse on hill, and dale, and plain."

In this "happy rural seat of various views," of groves—

"Whose rich trees wept odorous gums and balm,
Others whose fruit burnish'd with golden rind;
Hung amiable, ...
Betwixt them lawns, or level downs, and flocks
Grazing the tender herb, were interposed;
On palmy hillock: or the flowery lap
Of some irriguous valley spread her store,
Flowers of all hue, and without thorn the rose."

To this smiling picture, murmuring waters and "fringed banks," with "myrtle crowned" add their charms—

"The birds their choir apply; airs, vernal airs,
Breathing the smell of field and grove, attune
The trembling leaves."

The whole closing with a most attractive picture of happiness and contentment which all must appreciate:—

> "So hand in hand they pass'd, the loveliest pair
> That ever since in love's embraces met.
> Adam the goodliest man of men since born
> His sons, the fairest of her daughters Eve.
> Under a tuft of shade that on a green
> Stood whispering soft, by a fresh fountain side
> They sat them down; and after no more toil
> Of their sweet gardening labour than sufficed
> To recommend cool Zephyr, and make ease
> More easy."

77. This description is no less suggestive and instructive than it is gorgeous and sublime. It is not more distinguished by lofty genius than sound practical sense; it is a vivid representation of what taste and genius may accomplish now. Earth, air, and water, light and shade, form and colour, animation and repose, in their turn, utility and ornament, silence and the sweet voices of nature,—the song of birds, dash of waterfalls, and sweep of flowing rivers, as they speed onwards, over seas of pearl and sands of gold,—ambrosial fruits and delicious perfumes, and the idea of appropriation and possession,—all are here. It may be impossible to find a site so charming as the poet here describes; but the closer we can approach to it the nearer shall we approximate to perfection. The great characteristics that form the substratum of his glowing picture may be discovered and remembered by all, and enable any one to choose or reject a site in proportion as it approaches to, or falls greatly short of, the poet's standard.

78. The site of a garden depends on circumstances too numerous and varied to be even guessed at here. The owner of land, however small his domain, will find no difficulty in selecting one suitable to the pretensions of the house and his own tastes; for some men will think with Horace and Cowley, and wish to be master of a small house and large garden; while others will prefer having a different arrangement. In either case the choice is easily made, where the proprietor is able to choose for himself; for there are few localities in this country between the *ultima thule* of the extreme north and the Land's End where a good garden site may not be obtained. The few spots to be avoided are places of too great elevation and low marshy valleys: the first is too much exposed for either fruits, vegetables, or flowers to grow and ripen; in the other, the damp fogs common to such localities render the fruit vapid and flavourless, as well as dwarfed in size; with other disadvantages, which will be noticed afterwards. Within these limits, however, wherever a crop of wheat will grow and ripen, a good garden may be formed. While the difficulty of giving special directions as to site are thus enhanced by the innumerable variations of scenery, climate, and other circumstances, there are still a few characteristics in which every desirable site must agree. These appear to be SECURITY, HEALTHFULNESS, BEAUTY, UTILITY, VARIETY, CON-

GRUITY, SOCIETY, being taken for granted; the whole resulting in the highest possible amount of happiness.

79. *Security* is still the first consideration; for, even in our peaceful days, the first thing generally done after fixing on a site is to inclose it. In the olden time, the idea of safety was the chief thing considered, and the site for a house and garden was chosen much upon the same principle as the site of a fortress is now fixed on. In those days every man's—at least, every great man's—house was his castle in a very different sense to what it is now. Homes were then not so much sacred retreats from vulgar intrusion as citadels of defence, or the strongholds of petty tyrants. Hence houses were erected on the summits of bleak rocks, or in deep and secluded valleys, where artificial barriers of rocks almost perpendicular, strong walls, and a broad and deep moat, rendered them almost impregnable. These moats, when they came to be filled up in more peaceful times, supplied to some of these strongholds gardens of a most picturesque character; for many of these feudal fortresses were built in situations of great natural beauty. Now, although the idea of safety from danger and security from intrusion still lends a charm to every happy home, it need no longer be the primary object of selection; for, thanks to advancing intelligence, efficient laws, and improved morals, every one can now dwell in peace under his own vine and fig-tree, none daring to make him afraid. It is very pleasant, however, not to be overlooked while sitting there; and therefore a site for a house, as well as a garden, should be thoroughly inclosed,—not too close to a public path, and as much within its own grounds as possible.

80. *Salubrity.*—The second, and, indeed, the most important point, is the healthiness of the situation. Without health nothing can be enjoyed; with it, the humblest home and smallest garden may become a perennial source of happiness. Men rarely build a house or form a garden more than once in a lifetime; and an unfavourable choice will not only cause disappointment, but engender petty misery throughout an entire lifetime; and too much caution cannot be exercised on this point. Data should be collected from the bills of mortality, by visits to the graveyards, by converse with the people, by observing the number and condition of the aged inhabitants, by the presence or absence of epidemic diseases, by the nature of the soil and subsoil, by the state of the crops, and by the physical stamina and moral condition of the inhabitants. No advantageous offer of a cheap plot of land; no contiguity to a town or railway; no desire even to be near your business, beyond what necessity requires; or to be near old friends; no theoretical fancies about the ameliorating influence upon climate of thorough drainage, or the effect of scientific cultivation, should induce you to build in an unhealthy locality. Four sufficiently striking characteristics will generally distinguish a healthy site. It will be dry, warm, liberally supplied with pure water, and elevated more or less above the surrounding country.

81. *A Dry Soil and Subsoil* is the first condition of a healthy situation. The former can be made dry by drainage; the latter can scarcely be altered

by the power of man, unless at a ruinous expenditure of labour and money. Hence the importance of choosing a chalky, rocky, or gravelly subsoil, as the best site for building or gardening purposes, and of rejecting a green sand or heavy clay as the worst. Where the fall is ample, the worst of clays may to some extent be dried by efficient drainage; but the percolation of water through them is exceedingly slow, and is sometimes almost counteracted by the rapid conduction of water to the surface by the process of capillary attraction. It is this power that conducts the moisture up walls and through walks made on such soils. The same cause also imparts that peculiarly unhealthy musty odour characteristic of houses and gardens in damp situations. Papers on the walls are moulded, carpets rotted, furniture ruined: the roots of fruit-trees and other plants and shrubs literally starved by having their tender spongioles thrust into and kept in a perpetual cold bath, by the excessively active capillary power possessed by heavy soils, which originate sterility, stunted growth, disease, and death, among them; producing, also, the greatest of all miseries in a garden,—a wet adhesive soil and hard-baked surface. All, therefore, who value health, or wish to possess a garden as a means of contributing to their happiness, must choose a dry site, if they would enjoy it.

82. *Warmth.*—The second condition of a healthy situation is warmth, using the word comparatively, and with a special application to our own climate. It is well known that localities within a few miles of each other vary considerably in temperature. Other conditions being favourable, then, the warmer any given spot is, the better is it adapted for a garden site. A dry situation is much warmer than a wet one, because moist air is a rapid, and dry air a slow conductor of heat! and not a drop of water can be raised or evaporated from the surface of any body until it has been rendered buoyant by the absorption of heat from that body or the surrounding air; consequently, the greater the evaporation of water from the earth's surface, the colder, of necessity, that surface must become. The air is not sensibly heated by the direct communication of warmth by the sun's rays, but by its contact with the warm surface of the earth; whatever cools that surface, must, in the same proportion, lower the temperature of the air. Water, in fact, is the passenger to be conveyed; heat is the carriage that conveys it. Each passenger requires a separate carriage; consequently, the more drops requiring removal, the greater the absorption of heat, and, of necessity, the colder the earth and air in contact with it become. Every drop of water that passes through a porous soil, while it raises its temperature by communicating its own heat, also prevents the surface from being cooled by its own removal; the air is thus maintained in a dry state. The free percolation of water through the soil assists in warming the earth, and has thus a threefold influence in increasing its temperature. It not only, as we have just shown, adds to and prevents the destruction of the heat, but it envelops the earth in a stratum of dry air, which is one of the most efficient obstacles to the conduction or withdrawal of heat. Shelter is also a most efficient means of husbanding and preserving heat, and should

always be given from the north and north-east winds, by judicious planting. The site should be freely exposed to the south-east, south, south-west, and west, unless it is near the west coast, when some shelter may be necessary from the fierce winds of the Atlantic Ocean. But shelter on the north and north-east is indispensable in our climate, unless we choose to see our crops shrivelled up by the piercing winds that have just been robbed of all their heat by wrapping themselves round the gigantic icebergs of the polar seas.

83. *Pure Water*, liberally supplied, is essentially necessary to a healthy site. If a brook, spring, or river, originates in or passes through it, so much the better; but as this charm cannot always be secured, see that the water is bountifully supplied, easily got at, and of the purest quality. It should be tested by chemical analysis, and every means taken to prove that it is not tainted with vegetable or mineral poisons. Neither vegetables nor animals can long continue to enjoy health, unless this primary necessity of their very existence is provided to them in a pure state.

84. Rain-water is the purest that can be obtained without having recourse to distillation: it contains carbonic acid and oxygen, absorbed from the atmosphere. Spring-water filtered through granite and silicious rocks is tolerably pure; but springs which pass through limestone or chalk are impregnated with considerable portions of these substances. Lake and river water partakes of the soil which forms its bed or basin; and marsh waters abound in decomposed animal and vegetable matter. Pure water is tasteless and inodorous; the presence of carbonic acid renders it bright, sparkling, and more or less acidulated, as in the Carlsbad and Seltzer waters. When iron is held in solution by the carbonic acid, the water becomes chalybeate, as in the Cheltenham and Tunbridge waters. The presence of sulphuretted hydrogen distinguishes the Harrogate, Moffat, and many other medicinal springs. Hot springs are produced by silica held in solution by free soda, and formed in the vicinity of volcanic or other igneous rocks.

85. The saline taste in water arises from impregnation with earthy salts of lime, of magnesia, of common salt, and sometimes the bicarbonate of soda and potash. Iron gives an inky taste to the water, and a yellowish tint to linen washed in it. These salts are the cause of hardness, which filtration has no effect in removing; but it is softened by exposure to the air, and sometimes by boiling.

86. Availing himself of the chemical properties of chalk and lime, Dr. Clarke, of Aberdeen, has invented a process for purifying waters impregnated with lime or chalk, a combination very common in the water round London. When burnt in the kiln, a pound of chalk loses seven ounces of its weight by the withdrawal of carbonic acid, and becomes quicklime soluble in water; but it requires forty gallons to reduce it to lime-water. Another mode of rendering chalk soluble in water is the very reverse of this: in place of withdrawing the seven ounces of carbonic acid from the chalk by calcination, seven ounces of carbonic acid are added to it, and it is then soluble in water without perceptibly changing its appearance; in fact, the Thames water, after filtra-

tion, as it is now delivered to the inhabitants of London, contains a pound of chalk held in solution by this proportion of carbonic acid for every 560 gallons. Now it is found that, on mixing forty gallons of lime-water, or water in which nine ounces of quicklime is dissolved, with 560 gallons in which a pound of chalk is held in solution by seven ounces of carbonic acid, a haziness first occurs in the water, then it deepens into a white liquid, and soon assumes the appearance of a well-mixed whitewash. When the agitation subsides, it is found that the nine ounces of quicklime has again absorbed the seven ounces of carbonic acid, and that both that and the pound of chalk have been precipitated, leaving the water over it perfectly pure. Availing himself of these apparently opposing properties of chalk, Dr. Clarke proposes, when water is impregnated with lime or chalk, to have two cisterns, one in which lime-water is prepared, and another fourteen times larger, in which chalk is held in solution by the addition of the above proportion of carbonic acid; with a third cistern, in which the pure water can be drawn off. Dr. Clarke has proposed to do this for the water supply of all London, and the cost, he estimates, would not exceed £10 each day, an expense which would be much more than balanced by the value of the chalk precipitated, which would amount to many hundred tons per annum.

87. Lime and chalk being the chief agents in rendering water hard and unsuitable for domestic purposes, this mode of purification presents itself at once efficient and practicable. Where the more subtle salts are present in sufficient force to impart an offensive flavour, good water must be sought elsewhere.

88. *Elevation.*—A healthy site should also be elevated above the surrounding country. How beautifully the immortal Milton expresses this idea in the words already quoted. For many reasons, the south aspect and the side of a hill is the best of all positions. It will either be naturally dry, or capable of being easily rendered so by efficient drainage. It will be warm, by absorbing the greater part of the sun's rays, and being sheltered by the rising hill behind it. It may generally be economically watered by diverting the course of some trickling stream for the purpose; or, if a well is dug at the highest part of the ground, the water may be easily and cheaply conveyed wherever it is wanted. Such positions also enjoy immunity from those heavy fogs, and blinding mists, so characteristic of many of our most beautiful valleys. Where these mists abound, some of the loveliest houses, and most beautiful gardens, are enveloped in a thick covering of watery vapour during the most enjoyable hours of the morning and evening. Nothing can well be more antagonistic to health, or opposed to true enjoyment, than a garden so enwrapped in early morn and dewy eve. The dreamy hour of twilight cannot be enjoyed in the garden, except at the risk of sore throats, catarrh, and lung disease. The more charming the scene, the greater the deprivation,—the greater the danger to health. To be driven out of the garden by a sudden invasion of fog; to be compelled to shut the drawing-room windows amid the departing glories of the setting sun, is by no means pleasant. An elevated position is also free from the noxious effluvia so prevalent in low marshy localities, which will sail up the bottom of

a valley for miles, saturating the air with its noxious perfume; for the elevation of this moist polluted air may be almost as clearly defined as the tidal wave upon the seashore. Every consideration of health demands that the site for a garden or house should be chosen at a considerable altitude above the surrounding country. Such a site escapes—from the dryness of its air—the early spring and autumn frosts, which curtail the summer at both ends, and are often so fatal to the beauty as well as the productiveness of the garden. A site, to be desirable, should also be beautiful. Some gardens are so situated as only to make more apparent the surrounding barrenness, desolation, and deformity; others throw their own beauty over scenes of equal brightness, harmonizing with and heightening the beauty of the surrounding scenery. But here tastes and dispositions interpose in endless variety. One man prefers to be near the busy town, another considers most pleasant that solitude pictured by Pollok in his "Course of Time," where—

"Solitude of vast extent, untouch'd
By hand of Art; where Nature sow'd herself
And reap'd her crops; whose garments were the clouds;
Whose minstrels, brooks; whose lamps the moon and stars;
Whose organ-choir the voice of many waters;
Whose banquets, morning dews; whose heroes, storms;
Whose warriors, mighty winds; whose lovers, flowers;
Whose orators the thunderbolts of God;
Whose palaces the everlasting hills;
Whose ceiling, heaven's unfathomable blue;
And from whose rocky turrets, battled high,
Prospect immense, spread out on all sides round;
Lost now between the welkin and the main,
Now wall'd with hills that slept above the storm."

89. Philosophers, poets, ancient and modern, as well as landscape gardeners, all agree in this, that the site should be elevated above the surrounding country. Hence we have the inspired writer exclaiming, "Beautiful is Mount Zion." And Milton speaks of the—

"Rural mound and verdurous wall of Paradise,
Which to our general sire gave prospect large."

This "prospect large" constitutes, unless in very moist localities, one of the chief beauties of every garden; it not only confers dignity and importance upon, but virtually extends the boundary of the domain,—

"O'er hill and dale, o'er wood or lawn,
And verdant fields, and darkening heath between,
And villages embosom'd soft in trees,
And spiry towns by surging columns mark'd."

90. *Congruity.*—The charm of variety is quite consistent with another characteristic of a good site,—congruity. There is no necessity for throwing a number of beautiful things higgledy-piggledy together; and it is seldom necessary to form a garden in such a situation where the surrounding scenery

can neither be made to add to its charms nor harmonize with its beauty. Milton is a master of the art of congruity; crowded as his picture is, there is no confusion; everything seems placed in the best position for displaying its own beauty without detracting from the beauty of others. I must not, however, be tempted into speaking of the internal arrangements of the garden, which must form the subject of future elucidation; suffice it here to remark, that Milton's views were far in advance of those of many great gardeners even now, who compel us to admire flowers in juxtaposition with cabbages, onions, and potatoes, and set all the laws of congruity at defiance.

91. *Utility.*—The usefulness of a garden will very much depend upon the quality of its soil and the facilities it affords for easy access. At one time, a good soil was the main, if not the only consideration in choosing a garden; and it is still considered of great, though not of primary importance; for it is obviously more immediately under control than any of the other essential characteristics. Shallow soils can be deepened by trenching, wet soils dried by draining; poor soils enriched by manuring; stiff soils rendered workable by skilful admixture or by burning; light sandy soils brought to the proper texture by the application of marl; barren soils, if such there be, rendered fruitful by manuring; and incorrigibly bad soils bodily removed, and good soil substituted in their stead. Of course, any and all of these operations involve a considerable outlay of money; but they are less expensive and more practicable than improving the sanitary condition of a whole neighbourhood, conveying pure water for miles, and converting a flat uninteresting country into a beautiful landscape. While elevation continues to be a most desirable object in the site of a garden, it must not be on a hill so steep as to render it difficult or dangerous to reach it at any hour of the day or night; if it is so circumstanced, both the pleasure and utility of such a garden will be much impaired. It should be within an easy distance of a good public road, as road-making involves a large outlay, and road-keeping is a heavy item of expense. The length of a private or carriage-road to house or garden should be regulated, to a great extent, by the size of the house and extent of the grounds; a long winding road may be a very pretty object in itself, but it is disappointing if it leads to nothing. For ducal parks, or large estates, where expense is no object, so long as a road appears to be going in the direction of the house, the longer it is, the stronger the impression of extent produced, provided it terminate at a splendid mansion. But not only the length, but even the width of the carriage-road should correspond with the extent of the demesne; it is wretched taste to have a bold road skirting the boundaries of a small estate, and leading to something like a villa residence. On economical grounds, to save the expense of making and keeping the roads, and as a matter of convenience for the carting of manure, and all other utilitarian purposes, it is desirable that a site be easily and quickly accessible from a public road.

92. *Variety* is also a characteristic of a good site. Milton crowds almost every kind of natural beauty into his glowing picture; and in this he reveals

his complete knowledge of human nature. No beauty can continue to satisfy that is destitute of the fascinating charm of variety. Nature itself presents one magnificent series of incessant and never-ending change; the surface of the earth is variegated with sea and land, hill and dale, forests and burning sands; lofty mountains, sublime in their rugged grandeur; and flat prairies, like placid oceans of land. He who has an absolute power of choice, therefore, will do well to secure, not only a beautiful situation, in some such position as has been indicated, but one where the scenery is varied, and the landscape crowded with interesting objects. Get a distant glimpse of tapering spires, of rugged rocks, of the rushing train, and the everlasting mountains; of modern towns and crumbling ruins; of ducal parks and factory chimneys; of the grazing flocks and the bounding deer; and of the moon, shedding a sidelong gleam on some shaggy cave. If the hand of taste cannot create, it can at least develop and assist at the exhibition of these charms; in the words of Mason, it can call into sight

"You stately spire,
Pierce the opposing oaks' luxurious shade,
Bid yonder crowding hawthorns low retire,
Nor veil the glories of the golden mead.
Hail! sylvan wonders, hail! and hail the hand
Whose native taste thy native charms display'd!
Teaching one little acre to command
Each envied happiness of scene and shade."

And if all this variety of scene cannot be secured, at least let us choose as many of them as circumstances permit. Nature's own variety of the seasons, at least, may be secured,—Spring with its freshness, Summer with its beauty, Autumn with its rich warmth of glory, and pale Winter

"Casting his silvery mantle o'er the woods,
And binding in crystal chains the slumb'ring floods."

And the innumerable phases of variety which pervade the elements of earth and air, the sea, and flowing waters may be obtained; or, as Pollok has it, of—

"Day
And night, and rising suns and setting suns,
And clouds that seem like chariots of the saints
By fiery coursers drawn; as brightly hued
As if the glorious bushy, golden locks
Of thousand cherubim had been shorn off,
And on the temples hung of Morn and Even."

D. T. F.

FLOWING WELL OF THE PEAK, DERBYSHIRE.

CHAPTER IV.

MECHANICAL PREPARATION OF SOILS.

93. The great improver, not of soils only, but of the climate of whole districts when brought under its influence, is drainage. Within the present generation, localities, formerly known as raw, cold, swampy, and unproductive, with late harvests, if they could be said to deserve the name, have become warm and dry, yielding highly-productive crops, nearly approximating, in time, to the most forward districts, under the effects of drainage. Under its influence the moisture is made to percolate through the earth to its lowest level, drawn from a gradually extending circle, until the surrounding soil is freed from superfluous moisture, giving place to atmospheric air with its fertilizing effects ; while the atmosphere on the surface, which was formerly chilled by the effects of evaporation, is now rendered warm and genial ; for water long retains its heat ; and wherever water can flow, atmospheric air can follow.

94. While the general effects of drainage are so useful, however, it is difficult to give any specific directions on the subject. Every kind of soil requires a different treatment, and some are capable of being seriously injured by injudicious draining. There are few gardens in which it can be wholly dispensed with ; as a general rule, however, a light loamy or sandy soil, with a gravelly subsoil, and a natural slope to some outfall, requires no drainage whatever ; on the contrary, an admixture of clay is necessary to render it more retentive of moisture ; while a tenacious clay soil and subsoil require thorough drainage to render them suitable for garden purposes. Before attempting it, however, even on a small scale, some thought must be given to

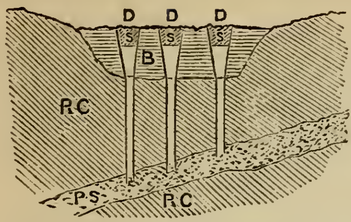
the locality, the soil and subsoil, the land-springs, and the average fall of rain in the district.

95. The object of drainage is to prevent water from stagnating in the soil, by promoting its free percolation through it rather than by evaporation, which has a tendency to reduce the temperature. The water to be withdrawn arises from one of three sources, or from all three together; namely, from land-springs, or from rain, or from fountain-heads at a higher level. The engraving at the head of this chapter represents one of these fountains, of a peculiar and somewhat mysterious character,—namely, a reciprocating spring. It is a sectional view of the flowing well of the Peak, in Derbyshire, and, although differing from most fountain-heads, it will serve to illustrate the subject. The commonly-received explanation does not, however, explain all the phenomena; it supposes an interior cavity A, discharging its waters by a siphon-formed channel, B C D. When the water is sufficiently high, it overflows the level C, running out until the water is too low to be forced over the vertex of the arch of the siphon. When forced into the channel, the waters descend through crevices in the rock, or they force themselves a path to some porous strata, still descending, till they reach some impervious rock or clay basin, where they again accumulate and spread themselves until some new channel is found at a lower level. Supposing this new basin to be impervious also, and the strata immediately over it to be a porous gravelly soil, or a clay soil with patches of gravel, the water will force its way upwards through those patches partly by the pressure of the water at the higher level from which it is supplied, and partly by the force of capillary attraction. This is generally the source of land-springs, which sometimes baffle the most skilful efforts at thorough drainage.

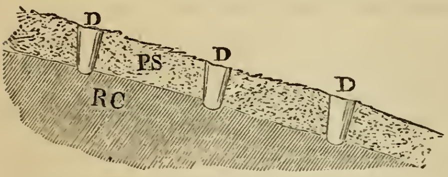
96. Other land-springs, collected in tenacious subsoils having no outlet, depend upon the fall of rain in the district. Water drawn from a higher level can only occur where the land is overlooked by neighbouring heights. In considering the amount of drainage requisite, it is to be borne in mind that the process of evaporation is a powerful agent in withdrawing water from the soil, surrounding it with a cold damp atmosphere, inimical to vegetation; while the percolation through the soil assists in preserving its warmth. The average fall of rain and evaporation in the ordinary soils round London may be stated as follows:—

	Inches of Rain.	Evaporation, in inches.
From January to May	8·75	4·45
From May to August	7·0	6·80
From August to October	5·50	3·75
In November	3·75	0·60
In December	1·75	0·17

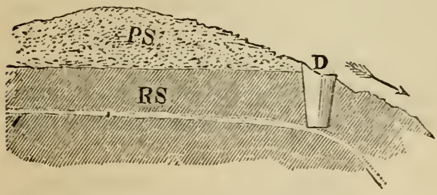
97. The first subject of inquiry on the eve of drainage is the nature of the soil to be operated upon. Where its base is an aluminous clay, it will be exceedingly tenacious of moisture, while a silicious deposit admits of very free percolation; from limestone rocks a chalky, friable, and moderately tenacious



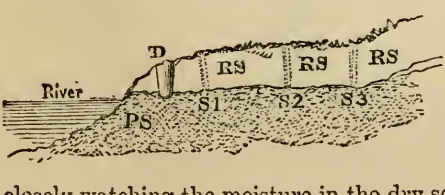
soil is obtained. On the proportion of each of these substances contained in the soil and subsoil, therefore, will depend the extent of drainage requisite. Supposing that the land to be drained is surrounded on two sides by high ground, the soil of which is a retentive clay, but which is known to be superposed on a bed of sand or gravel, it is obvious that in order to render the drains, D D D, effective, it will be necessary to pierce the stiff clay in order to carry the surplus water into the looser soil P S. This is done by draining B by means of the drains S S S in the usual way; but at their outfall, or lowest part, the clay R C is pierced by an auger, and a passage made for the water into the gravelly stratum P S.



98. Another case, of not very uncommon occurrence, arises when a loose sandy or friable soil rests on a substratum of clay. Here all the moisture not taken up by evaporation is either diffused through the gravel or absorbed into the tenacious subsoil, from which it has no escape through the soil R C. Sinking a drain to the bottom of the soil will not here serve the purpose, unless it is sunk sufficiently deep into the subsoil R C to remove the moisture absorbed at the surface of the substratum, although a false economy, and the advice of ignorant workmen, might recommend such a course.



99. In another case, nearly resembling the above, where a porous soil rests on stiff tenacious subsoil, R S, but crops out, or terminates, in a gravelly porous soil, having no power to retain water, it is evident the water would follow the surface of the retentive soil, in the direction of the arrow. To obviate this, a main-drain is required at D, which will intercept and carry off the water from the porous soil P S.



100. In the neighbourhood of rivers it is not unusual to find a retentive soil, R S, rendered wet and spongy by the presence of land-springs, S 1, S 2, S 3, which force themselves up through the retentive soil by capillary attraction. In this case, a drain should be cut through the retentive soil below the lowest spring, S 1, which, however, is to be ascertained by closely watching the moisture in the dry season.

101. The materials employed in covering drains are very varied,—brushwood, rubble, stones, bricks, and pipes being all in use; and in clay countries it has been not unusual to form pipes with the clay itself, by inserting an arched framework of wood, and withdrawing it when consolidated. The best and cheapest drains, however, are drain-pipes, which are now obtainable everywhere on moderate terms.

102. The implements used in drainage are a spade, or, in deep draining, and in a clay soil, a series of two or three spades, varying in size, and each sloping to the point, and slightly rounded, so as to make a circular cut; a spoon-like implement for lifting the loose soil clear out of the bottom of the trench; and a level, which may easily be formed by fixing three perfectly straight-edged boards in an upright position and in a triangular form, held together by a vertical board in the centre, with an opening at its base for a line and plummet.

103. Having everything prepared, and a well-devised system laid down, which should include the depth and size of the drains, as well as their distance from each other,—considerations which will depend on the nature of the soil and subsoil,—two points, however, which continue to be a question of great doubt, the advocates of deep drainage in heavy soils contending, that water will find its level, which is in the bottom of the drain, through holes and crannies innumerable; and that the deeper the drain the wider is the area affected; on the other hand, it is contended, that while this doctrine is founded in truth, it has its limits, and that beyond a certain depth the influence of the drain is lost. A sort of compromise has been the result, and very deep drainage has been nearly abandoned. On this subject the views expressed by our contributor, Mr. Chitty, in the following remarks, probably express the opinion of the majority of practical men. "Observe," he says, "that the depth should vary with the nature of the soil. If the subsoil is a stiff retentive clay, care should be taken to go no deeper than is necessary to be out of the way of the spade in digging and trenching, or to give the necessary fall; for every ground workman knows that water does not readily filter through clay, and draining land is for the purpose of drawing the water quickly off the surface, to prevent stagnation, and to admit of going on it immediately after rain; therefore, to lay drains so deep into the clay that water would be weeks in filtering to them, would be the height of folly. If the ground be more porous, let the drains be three, but not more than four, feet deep. Having got the trenches ready, lay in the pipes, and cover them for a few inches with rough porous rubbish, or broken crockery, or any such material, and the drains will be effective and permanent. The mode I prefer is to lay soles or flat tiles, and on these to set half-pipes or bridge-pipes, which are of a tunnel-shape, and on these to lay the rough stuff, and fill in with earth, which should not be rammed or trodden very tight, but allowed to settle. If the trenches are merely filled with rough stuff to the thickness of a foot or so, it will be effective, but not so permanent; even brushwood will do, and sometimes last for many years in clay soils."

104. The drain shown in *fig. A* is cut through a stratum of porous soil for

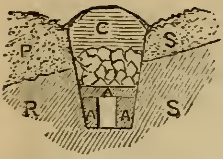


fig A

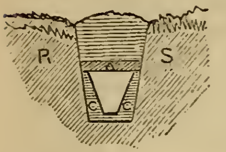


fig B

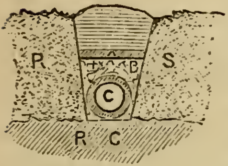


fig C

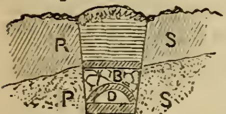
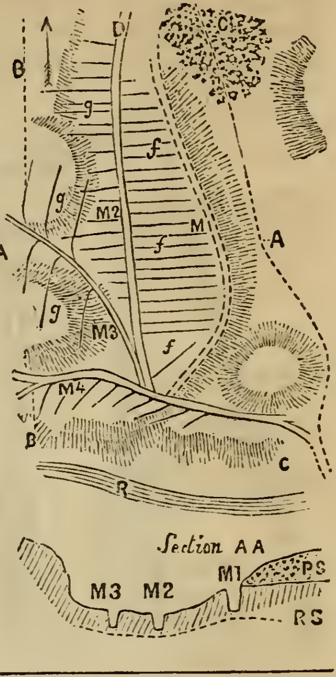


fig D

about 2 feet, and through the clay subsoil, R S, about 30 inches. A A A are pieces of flat stone, two on each side, supporting the horizontal one: over it is laid a layer of round stones, B, over which the soil is replaced. In *fig. B* is another form of drain, suitable for retentive soils. The construction is the same: two stones or tiles, placed at right angles, rest against the sides, and a third is placed horizontally over them; the soil is replaced, the looser parts being at the bottom. In *fig. C* we have the most perfect of all drainage: a circular drain-pipe, C, is laid at the bottom of the trench; over it are laid, first, the roughest rubble, B, available,—a slate or tile, A, laid across over the rough stones will prevent roots penetrating to the pipes, as well as the earth from falling in through the stones. In *fig. D* we have the arrangement which Mr. Chitty considers the most convenient, especially for porous soils. A serviceable flat tile or sole is laid flat in the bottom of the open trench, resting on a solid and perfectly level bed, gently falling from the higher ground to the outflow; over the tile is laid a semicircular tile, forming an arch extending uninterruptedly along the length of the drain; over this is thrown a layer of rough stones and rubble, 6 or 8 inches thick; over this a tile, to keep out sand, roots of trees, and other destructive agencies; and over the whole the surface-soil is again filled in. We have to add that in *fig. C*, our artist has failed to sink the drain into the substratum R C. The consequence of such an error in practice is explained in para. 98.

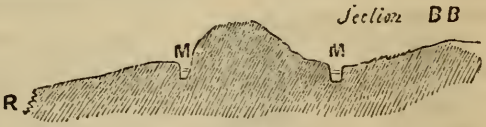
105. In laying down a system of drainage, the chief attention is required to the surface of the ground.—Is it level or undulating? Is it commanded by neighbouring heights? The next consideration is the question of outfall. Let us imagine an area of say ten acres and a half, which is to become the site of a house and range of gardens, of which the accompanying is a sketch. Its southern boundary is a river flowing from west to east, or nearly so. On the eastern extremity rises a gentle hill, sloping off towards the river,—light sandy soil with clay subsoil. Beyond it a brook drains its eastern slopes, flowing into the larger river a little to the eastward: to the north, this hill inclines slightly to the west. On the west rises a similar hill, the profile of which is seen in the cross section, R S: this height rises rather abruptly from the river, slopes off towards the north, but rises again, the heights running nearly parallel to the eastern range, leaving a gentle undulating valley between them, sloping off towards the river; a site, it will be observed, of great capabilities in a picturesque point of view, when it is laid out as gardens and filled up with trees.

106. Having surveyed and mapped out this area, which may be done either by means of the theodolite, or by a spirit-level and actual measurement, it will be found to contain a small valley ranging from north to south, surrounded on three sides by gently-rising ground. The bed of the valley is a stiff clay, and somewhat marshy, from the overflowing of the brook which occupies its eastern extremity. The heights to the east range away for about 1,000 feet to the north, the summit being a bed of gravel, which crops out, and joins the clay at the line indicated in the drain, M 2. On the rising ground to the north a small pond or lake collects the waters from the surrounding gravel-beds, and has retained them until they have forced their way into the valley. Two gentle elevations, with a depression between them, occupy the west, an ancient pasture-ground, that best of all material for forming a garden. To the south the land falls off gently to the bed of the river, which flows from west to east, some half a mile distant.



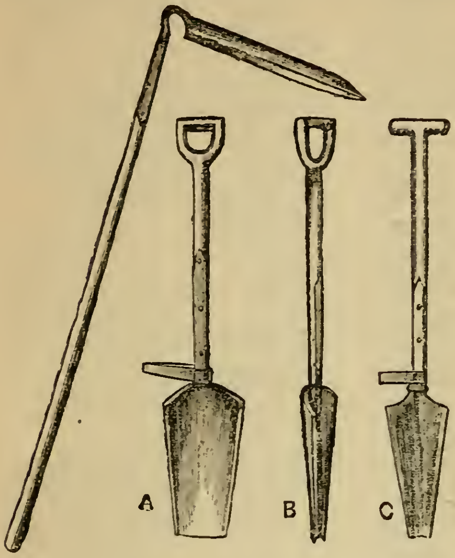
PLAN AND CROSS SECTION AA.

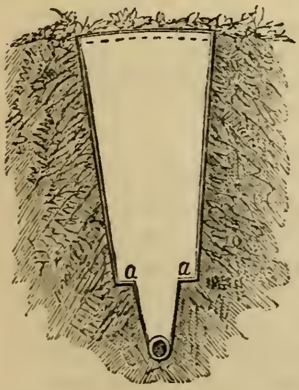
107. Having mapped out the area, we find that it contains about 1,000 feet, ranging towards the north and north-west, the mouth of the valley, where it opens out towards the river, being about 400 feet wide, the country falling in undulating scenery beyond. In order to secure the thorough drainage of this site, a deep main drain, M 2, must run from the foot of the northern heights to another main drain, M 4, intersecting it at the lower part of the valley, and carrying the accumulated waters into the brook lying to the east. These two drains are, of course, the key to the whole system, and should either be barrel-drains or pipe-drains of the largest size, fitted in with glazed pipes properly jointed, with socket-joints and elbow-joints to receive the lateral drains. The size and kind of drains, however, should be matter of very exact calculation, based on the average fall of rain in the neighbourhood, and the arrangements for securing the house sewage within the grounds. Nothing but the overflow should be suffered to escape through these drains; but they must be of sufficient size to provide for any possible fall of water.



PROFILE OF WEST HILL.

108. In excavating the drains, the first operation is to cut the intersecting drain, M 4, beginning at the outfall near the brook. The depth will depend upon the level of the brook when full; but, supposing there is a good fall, it should not be less than 4½ feet. The width at the surface should be laid out neatly with the line and reel, and the first spit removed of a width in which the man can work conveniently, gradually tapering towards the bottom. The earth, as it is removed, should be thrown to the lower side of the drain—first, because it is easier for the workmen, but also to prevent a slip of the soil caused by the incumbent weight, if heavy rains occurred while the work was in progress. Having dug out the soil to within 8 or 9 inches of the bottom, for which the draining-spade A is generally used, the bottom being of a breadth convenient for the workman, the remaining space is required to be much narrower, and is excavated by means of the bottom-tools, B and C, the workman standing on the shoulders, *a a*, the bottom being made smooth and level by means of the scoop, of which several sizes are in use. This drain being opened in its whole length, the main drain is proceeded with in the same manner, taking care that while the bottom is left smooth, it should have a proper fall in its whole length, and that if there is no natural fall in the land, one should be produced by making the head of the drain shallower than the outfall. If the soil is clay, and likely to bear the exposure without falling in, it will greatly facilitate the work to open the other main drains, M 1 and M 3, both of which are to be executed in the same manner. The advantages of this are twofold: the person charged with the work will see that these drains are all at the proper level; he will see, also, the quantity of water flowing in them, which will, in many instances, enable him to check his calculations, and provide against unexpected land-springs. Having satisfied himself that his main drains are in proper order, and laid down the pipes,





marked out his feeding-drains, and inserted pipes with elbow-joints at their outfall to receive them, he begins by opening those at D, farthest from the outfall, filling in each as fast as the pipes can be laid. This is necessary, as frosts might occur, and cause considerable damage to the open works.

109. In the soils we have indicated, the main drain M 2 would require to be both deep and strongly constructed, probably four feet, laid with 9 or 12-inch pipes, with junction-sockets and elbow-joints to receive the lateral drains. The lateral main drains, M 1, M 3, M 4, should be three feet deep, increasing to four feet near to the junction, entering the main drain with a fall of six inches in the last six feet, the pipes four or six inches in diameter; but each the result of close calculation of the water to be carried off.

110. The feeders *fff* to the main drain M 2, should be 3-inch pipes, beginning at three feet, increasing to three and a half, as in the former case; while for the feeders *gg*, of the lateral main drains, 2-inch pipes will probably suffice. Each of the feeders should be from fifteen to twenty feet apart for garden purposes. These should enter the main drain obliquely, and not at right angles, as in the engraving.

111. Where house sewage and the overflow of cisterns have to be provided for, a barrel-drain will probably be requisite; and its size will be a matter of calculation before construction.

112. As in the case of the lateral main drains, so in the feeders; the fall at the junction should not be less than 3 or 4 inches; they may be from 15 to 20 feet apart, according to the nature of the soil, and their minimum depth 30 inches: this will allow for the deepest trenching without disturbing the drain.

113. The best pipes for these feeders are 2-inch pipes, which vary in different localities from 11 to 15 feet in length, and are from 30*s.* to 35*s.* per 1,000. They are sometimes laid with collars, that is, short pieces of piping sufficiently large to receive the ends of two pipes; thus keeping them firmlyin their place. These collars are sometimes perforated on the upper surface to admit the water. We have sometimes seen the pipes bound together by bands of tempered clay at the junction of the pipes, which answered very well; but in this case the upper sides of the pipes were perforated with holes for the reception of the water, so that the solid junction of the pipes was unobjectionable on that account. It is not usual, however, to do more than lay the pipes in a straight line when the workman is left to himself; and few will do that unless very closely watched. In the junction with the main drains the union should be carefully made, either by clay or cement, where permanent drainage is expected.

114. The rationale of drainage is very happily explained by our contributor Mr. D. S. Fish, Lady Cullum's gardener at Hardwicke. "Drainage," he says, "as popularly understood, means the art of laying land dry. This, however, is a very imperfect definition, either of its theoretical principles or practical results. Paradoxical as it may appear, drainage is almost as useful in keeping land moist as in laying it dry. Its proper function is to maintain

the soil in the best possible hygrometrical condition for the development of vegetable life. Drainage has also a powerful influence in altering the texture of soils. It enriches their plant-feeding capabilities; elevates their temperature, and improves the general climate of a whole district, by increasing its temperature, and removing unhealthy exhalations and fœtid miasmas,—the fruitful hotbeds of fevers and agues, which desolate all damp districts. It lays land dry, by removing superfluous water; it keeps it moist, by increasing its power of resisting the force of evaporation; it alters the texture, by the conduction of water, and by filling the interstices previously occupied by that fluid with atmospheric air; it enriches the soil, by separating carbonic acid gas and ammonia from the atmosphere, and by facilitating the decomposition, absorption, and amalgamation of liquid and solid manures. It heightens the temperature of the earth, by husbanding its heat, and surrounding it with an envelope of comparatively dry air, and by substituting the air for water withdrawn through the interstices of the soil; for while the tendency of excessive moisture in the soil is to bind the whole mass into an almost solid substance; so the tendency of air is to separate its particles into separate atoms, and render it porous: and the more porous a soil is, the greater is its power of resisting evaporation. For this reason, porous soils are more moist in hot weather than those of a more tenacious character.

115. "Drainage enriches soils in another way. All rain-water is more or less charged with carbonic acid gas and ammonia. Now, the larger the quantity of rain-water that passes through the soil, the greater will be the amount of these gases brought in contact with the roots of plants. Nor is this all: solid manures of the richest quality are comparatively useless on wet heavy soils; for while a certain amount of moisture is essential to the decomposition of manures, an excess arrests the process, and all the most soluble portions are washed out long before it is sufficiently decomposed to enter into the composition of plants. Judicious drainage, therefore, places the soil in a proper hygrometrical condition for performing its important function."

116. Next to drainage, fire is the great ameliorator of soils; and in laying out garden-grounds, where clay forms the soil or subsoil, calcination will be found a most effective fertilizer. The land being thoroughly drained, and the paths marked out according to the working plan, it will be necessary to fill up all inequalities of the surface; for a garden or lawn should present no inequality beyond a gentle slope. This inequality is to be removed by levelling the high parts and filling up all hollows with the earth removed from them, and by grubbing up all trees and shrubs which are not intended to stand: as a general rule, none such should be left. When the surface-soil is of a loamy, friable description, the first spit, for eight or nine inches, should be carefully preserved in a heap with its herbage: it is the most valuable compost the gardener possesses. Even where it is a stiff clay, a mixture of sandy soil and lime will impart all the best fertilizing characters to it. When the subsoil is a stiff unmanageable clay, calcination will render it a valuable

garden soil, and when there are trees and shrubs to be grubbed up, those burned with it will impart highly fertilizing qualities.

117. The calcining process is commenced by building up a temporary furnace of bricks or stone, with some iron bars laid across them for the free admission of air. On this a fire is lighted, with such material as there may be at hand: over that a layer of clay is placed, to which the fire soon extends. More clay is added, and the heap extends in all directions, taking care that ventilation is kept up under it, and that clay is added by degrees, mixing it with fuel. In this manner the whole surface of the ground may be pared, calcined, and afterwards made smooth and levelled by rolling, and the turf replaced on places where it is to be preserved.

118. Highly-burnt clay is useful as a covering for roads and paths, where gravel is inaccessible; its chief objection, as a surface material for paths, being its colour; for the oxide of iron present in all clay soils, uniting with oxygen, gives it a dark red brick-colour. This property is usefully applied in the modern style of laying out flower-beds with variegated paths; marble and granite chips being used for white and grey paths, gravel for yellow, and burnt clay for red, with a very happy effect. The mode of burning clay varies in different counties. Some clays burn hard when dry, others when wet. In some places, where it is only required as manure, the waste corners of fields and scourings of the ditches are burnt in heaps and scattered over the ground. When all the land is burned, as many as forty heaps are scattered over an acre, and when reduced to about half their bulk, the fires are extinguished. Sometimes, however, the burning takes place in large heaps, varying from two to three hundred loads, fresh materials being added as the fire makes its appearance outside. The object not being to burn the clay into a hard red brick, however, it is just heated sufficiently to disintegrate the clay, so that it crumbles into dust between the finger and thumb. Where the burning is taken by the piece, and in large heaps, the cost of digging and burning is from *5d.* to *7d.* the yard of ashes. When the burning is in heaps forty to the acre, it costs about 8*s.* This cost, however, increases with the purity of the clay; but the benefit derived from the process increases also, especially if it is not confined to simply paring and burning the surface, but removing the stiff subsoil itself, and exposing it to calcination. The secret of burning strong clay is to throw it wet upon the burning heap, raking it down flat as the lumps begin to crack; thus increasing the surface exposed to the action of the heat and atmosphere; taking care, in windy weather, to apply the fresh material on the leeward side, or that side will be burnt before the other is touched. Burnt in this way, the lumps will crumble under the rake in a short time; if applied dry, on the contrary, the hard lumps will become harder.

119. That the process of burning is highly beneficial there can be no doubt. The garden of Mr. Baker, of Hardwick Court, Gloucester, consisted of a stiff sterile clay: by digging out the soil three feet deep and burning it, he ren-

dered it as remarkable for its fertility as it had been before for the reverse. The authorities, however, are not agreed as to the causes of this increased fertility. In the natural state of clay, it may be digested for hours with concentrated sulphuric acid without dissolving; but, when slightly burnt, it dissolves in acids with great ease, while the silica is separated into its gelatinous and soluble form. The soil is rendered accessible to air, oxygen, and carbonic acid, according to Liebig; and these are the principal conditions favourable to the development of roots. Common potter's clay contains within it all the constituents necessary to the luxuriant growth of plants; but they must be presented in a state fit to be taken up by the roots of plants—gentle calcination communicates these properties.

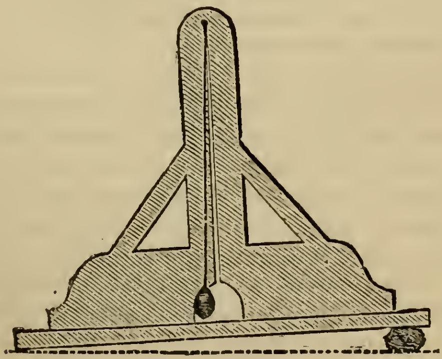
120. Burning the soil thus operates by chemical and mechanical agency; the compact clay has been hitherto impervious to atmospheric influence; the half-decomposed remains of former crops have remained in the soil an inert mass of organic matter. By burning, the saline constituents of former crops are unlocked and rendered soluble in water, and become available as food to the plants. Moreover, the application of heat has rendered the surface porous and friable,—its mechanical condition has undergone an entire change; and Liebig considers that its power of attracting ammonia from the atmosphere is increased far beyond that of any natural soil; while Dr. Voelcker regards potash, which is liberated on burning the clay, as the chief source of its efficacy.

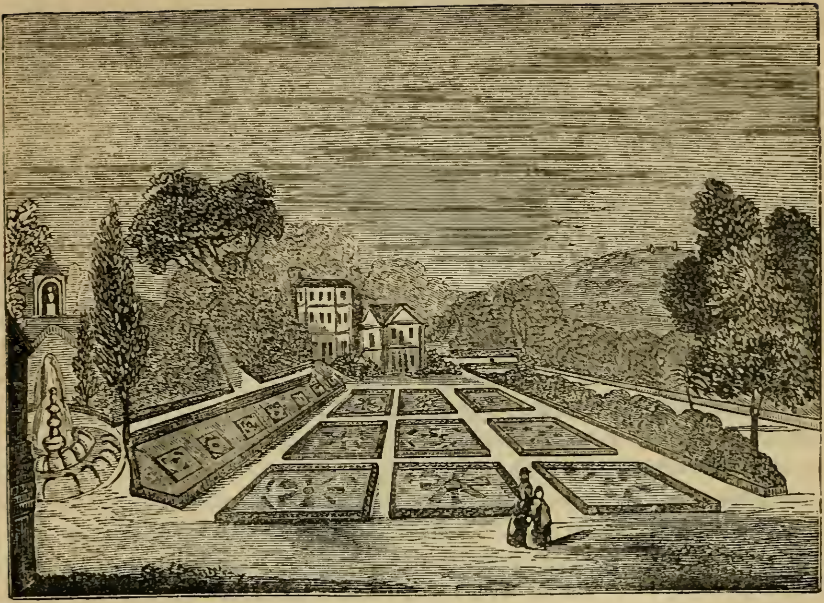
121. Burning is attended with especial advantage to peat soils, in which the accumulation of organic matter is prejudicial to all vegetation. In burning, the sour humus which is formed by marshy soils is destroyed, and the insoluble particles occurring in it rendered soluble and available as fertilizers.

122. Next in importance to these operations is the application of lime and atmospheric air, which is a combination of oxygen and hydrogen;—one of the objects of drainage being to admit oxygen, with the other constituents of atmospheric air, into the soil. This process is facilitated by the deep trenching which usually follows the thorough drainage of a garden ground. The immediate object of trenching is to deepen the soil, and prepare the subsoil to nourish the fibres of deep-rooting plants. The operation is commenced by throwing out the top spit to a convenient breadth for the workman, and wheeling it to the farther end of the bed or quarter; the second spit is treated in the same manner if the trenching is to be three spades deep. This done, the bottom of the trench is dug up as roughly as possible so that it is left level. The top spit of a second portion of the ground is now removed and placed alongside the first, and the second spit of this portion is dug up and placed roughly over the first trench. The first spit of a third portion is now removed and placed in as large masses as possible over the first trench: the bottom of the second trench is now dug up in the same manner as the first, and so on till the whole is finished. Thus, while the entire soil is stirred to the depth of two feet, it retains its original position; the surface being left exposed for a time in rough unbroken lumps, till it crumbles naturally under the dis-

integrating influence of the atmosphere. Oxygen enters into combination with all soils; and it can be demonstrated that about one-half of the materials of the globe's crust, including its animal and vegetable products, is composed of oxygen. The chemist can only obtain it as a gas; but when combined, it assumes divers forms, and occurs as liquids and solids, as well as a gas. About a half by weight of flint, rock-crystal, and other forms of silica, is oxygen; about a third of alumina, or pure clay, by measure, and a fifth of the atmosphere by weight, are oxygen; and no plant or animal can exist without oxygen entering largely into its constitution.

123. "Lime, employed as a manure," to quote Dr. Scoffern's "Handy-Book," "performs three well-marked functions at least, perhaps more: in all it is a powerful ameliorator of soils, and under two series of conditions it should be used in different forms. New-burned caustic lime is a powerfully corrosive body; when brought into contact with animal and vegetable tissues, it rapidly disorganizes them. Even if the tissues be living, still the quicklime will effect their disorganization. Hence arise the following deductions. When we have to deal with a rank new soil, teeming with noxious weeds, and with seeds ready to spring into life on the first opportunity, or when the object is to convert hard animal tissues, such as horn or kelp, or even softer ones, as clippings of woollen cloth, into a useful manure, unslaked lime is employed. On the other hand, when the object in adding lime to the soil is to supply the calcareous element as a mechanical means of ameliorating the texture of the soil, and a physiological means of supplying food to certain crops, and where there are no weeds nor noxious germs to destroy, nor organic tissues to decompose, then the employment of lime should be in the mild or slaked state." In both its forms, therefore, lime is a powerful agent in the improvement of soils, especially those in which clay and peat exist to any extent.





BELVIDERE GARDENS.

CHAPTER V.

ON GARDENING STYLES AND GARDEN PLANS.

124. It should be the object of Art to render Nature still more charming:

> "For Nature ne'er deserts the wise and pure;
> No plot so narrow be, but Nature there,
> No waste so vacant, but may well employ
> Each faculty of sense, and keep the heart
> Awake to love and beauty."

Not, however, that Art should ever strive to imitate so as to be mistaken for Nature; this, if possible, is not desirable,—it would rob Art of half its merit, without attaining either beauty or grandeur; for, after all, the gardener operates on a very limited scale, even when the widest scope is given to his genius. A garden is a work of Art, and Art ought to be avowedly present in every part of it. The meandering path, winding through tangled thickets, beneath the spreading cedar, of which the "lichen staineth the stem," is as much a work of art as the highly-embellished geometrical garden, the architectural terraces and vases which overlook it, or the fountain which occupies its centre. Nature, in dishabille, is beautiful in a wood, at home on the bleak moor and rugged mountain,—often admissible in a park, but would be incongruous and misplaced in a garden; and where such features have been introduced, on the pretence of making "natural gardens," the abortions are a libel on good taste. A dwelling-house might, with as much propriety, be built in imitation of a natural cave, as an artificial garden so arranged as to be mistaken for a bit of natural scenery. On the other hand, by proceeding with the idea that Art is to be apparent, the capabilities of the site and resources of the garden will be fully developed, if the designs are tasteful and skilfully carried into execution.

125. The arrangement of the glass structures is a matter of greater importance than it appears to be at first sight, and requires much more attention than it has sometimes received. Glass, sufficient to form a magnificent block of houses, is frequently scattered over the grounds, creating an appearance of confusion, and interfering most unnecessarily with the economy both of space and labour. To say nothing of the additional expense of working detached houses, they are often so placed as to become an intolerable nuisance, instead of a source of comfort and enjoyment to their possessor. All such structures should be distinguished by utility, ornament, and convenience. The first is often sacrificed to antiquated routine, and houses, built for the culture of tropical plants and fruits, made to exclude more than half of the little light we can afford them. But the genius of Routine waves her wand, and *lean-to* houses, with opaque backs — these antiquated dormitories for plants—still arise at her bidding; ornamental glass houses seem studiously shunned in many gardens, as if, the uglier houses could be made, the better they must needs be adapted for their intended purposes. Nevertheless, a large measure of structural and decorative beauty is compatible with the highest cultural advantages, and consistent with the severest economy. Glass houses are a never-failing resource on wet days; when other amusements fail and outdoor exercise becomes impossible; it is then that they should contribute their largest quota of enjoyment. They should therefore be always accessible from the drawing-room, without the necessity of going out of doors. Probably, the best possible arrangement is to attach the conservatory to the mansion; and, where there are other houses, to connect all with the conservatory, by the intervention of a glass passage or verandah. Of course, where there is only one house, whatever its form and designation, this applies with even more force. All glass houses ought to be span, curvilinear, or ridge-and-furrow roofed, and should be placed at right angles with the verandah, their end doors communicating with it. They should run north and south, and present east and west aspects to the sun's rays, which is decidedly the best for general purposes. Rooms for young men—fruit-room —mushroom-pits, retarding and propagating houses—potting and tool sheds, &c., should also be placed near to them. Perhaps a span-roofed building, divided in the centre, and running up at one point to the glass, with a building at one end for the reception of a boiler to heat the whole range, would be the very best, and certainly the most economical arrangement. The gardener's cottage might also be placed either here, or at the extremity of the centre walk in the kitchen-garden, where a terminal Tudor façade would be ornamental as well as convenient. The glass arcade or verandah should terminate in a

handsome fountain or vase, and have an outlet into the kitchen-garden. It might also branch off to the stables, and thus bring the whole home attractions within easy and comfortable access of the dwelling-house in all weathers. The frame-ground should be placed close to the stables, and be large enough to answer the purposes of a soil-yard as well as a reserve garden.

126. Having thus settled the position of all the necessary buildings, the next point is the sewage-removal and water-supply. All the sewage from house and stables should be conveyed into one large tank in the frame-ground. In no other country is there such waste of the richest manure as in these islands, where it may be safely asserted that many millions sterling annually run down our brooks, poisoning man and beast; for, when so disposed of, the liquid manure thrown away is truly "matter in the wrong place," as Lord Palmerston has well said. Applied in a proper state of dilution, nothing can be more valuable to growing crops of every description. The tank would, of course, be covered or domed over, furnished with a pump for raising the liquid, and an outlet for an overflow,—which, however, with proper management, would seldom be required.

127. In many situations, especially on the side of a hill, abundance of water is to be found at a higher elevation than the house; and in these cases the supply of water to house and garden is simply and easily effected. All that is needful is to form a reservoir, and lay down pipes; generally, however, spring-water has to be raised from a considerable depth. The great point is to form the tank high enough to enable the water to come down by its own specific gravity to wherever it is wanted afterwards. On the same principle, tanks for rain-water should be built as much as possible above the level of the surface, to obviate the necessity of raising it for use; and as the operation of laying down pipes involves the removal of large quantities of earth, this should always precede any direct operations on the garden. The position of fountains, ornamental water, and waterfalls, should also be determined, in order that their future supply may be provided for, by laying the necessary pipes at once. The direction of the sewers, drains, and water-pipes should also be carefully delineated on the plan, as well as indicated on the grounds by specific marks.

128. All modern writers and practitioners now agree that the pleasure-garden should be contiguous to the house. The fact of its contiguity to the mansion will have much influence upon the character of the garden. Certain styles of architecture require corresponding styles of gardening as their proper accompaniments. An imposing and highly-finished façade seems to demand formal terraces and geometric gardens as a proper and congruous base. Hence we have Gothic, Italian, French, and Dutch styles of gardening, which are all branches of the formal or geometric style, and may be described as presenting regular forms, or groups of figures, arranged in mathematical lines, either regularly straight or curved, and at regulated distances. This is much the most useful and effective style of flower-garden. The groups may be sunk beneath the surface, when they are called Dutch gardens; or the figures can be edged with stone or tiles, and thus be constituted architectural gardens;

the character and design of the edging corresponding with the architecture of the house, often supported by retaining walls, with massive piers for vases, and embellished with fountains. As a transition from the house to the garden, nothing can be more pleasing than a geometric pleasure-garden, laid out in turf or gravel, connected with the house by an upper and lower terrace, and descending by broad stone steps, Horace Walpole's satirical remark about "walking up and down stairs out of doors," notwithstanding.

129. The Gardenesque style may be described as a skilful disposition of trees and shrubs, in regular or irregular figures, or singly and at equal or unequal distances, preserving, amid apparent irregularity, a certain degree of uniformity. The chief feature of this style is, that no two plants shall be planted so close together as to touch each other, and that no indiscriminate mixture of flowers of different species shall be permitted in the same clump. This style is generally employed in arboretums and pinetums, and is the only one capable of exhibiting individual plants, shrubs, and trees in perfection. It forms a tasteful gradation between the geometric and the picturesque style. The latter, Mr. Loudon defines as imitating nature in a wild state, according to art. He also gives an example of how this can be done :—"A gravel pit would be improved, according to art, if foreign trees, shrubs, and plants, even to the grasses, were introduced instead of indigenous ones; or a Swiss cottage instead of a hovel. Rock scenery, aquatic scenery, dale or dingle scenery, forest scenery, copse scenery, and open glade scenery, may all be imitated on the same principle; viz. that of substituting foreign for indigenous vegetation, and laying out regular walks. This is sufficient to constitute a picturesque imitation of natural scenery." Thus the picturesque style may be said to consist of irregular groups of figures, masses or clumps, disposed at irregular intervals; for, in this style, the grouping is everything,—individual effect nothing. It is the connecting link, as it were, between the garden and the natural scenery outside. Notwithstanding all that has been written about the importance of purity of style, I believe that every large garden should combine all the three styles. I have, therefore, done so in the accompanying designs. Furnishing the house with a broad and elevated base of gravel to stand upon, a geometrical flower-garden succeeds it, supported by an ornamental wall, which may be said to terminate in the architectural alcove at each end of the west walk. The lawn itself is laid out in the gardenesque style, and all beyond the serpentine walk, on the east side, belongs to the picturesque style. The transition from the highest artistic finish to nature undressed is gradual and easy, and, as it appears to me, satisfactory to the mind.

130. In the accompanying range of garden and pleasure grounds, in which I have endeavoured to embody these principles, I have not been unmindful of the prayer of Cowley—

"Ah! yet ere I descend into the grave,
May I a small house and large garden have."

The house is modest in its pretensions; the garden-ground covering an area of about a thousand feet by four hundred; or, including house and offices,

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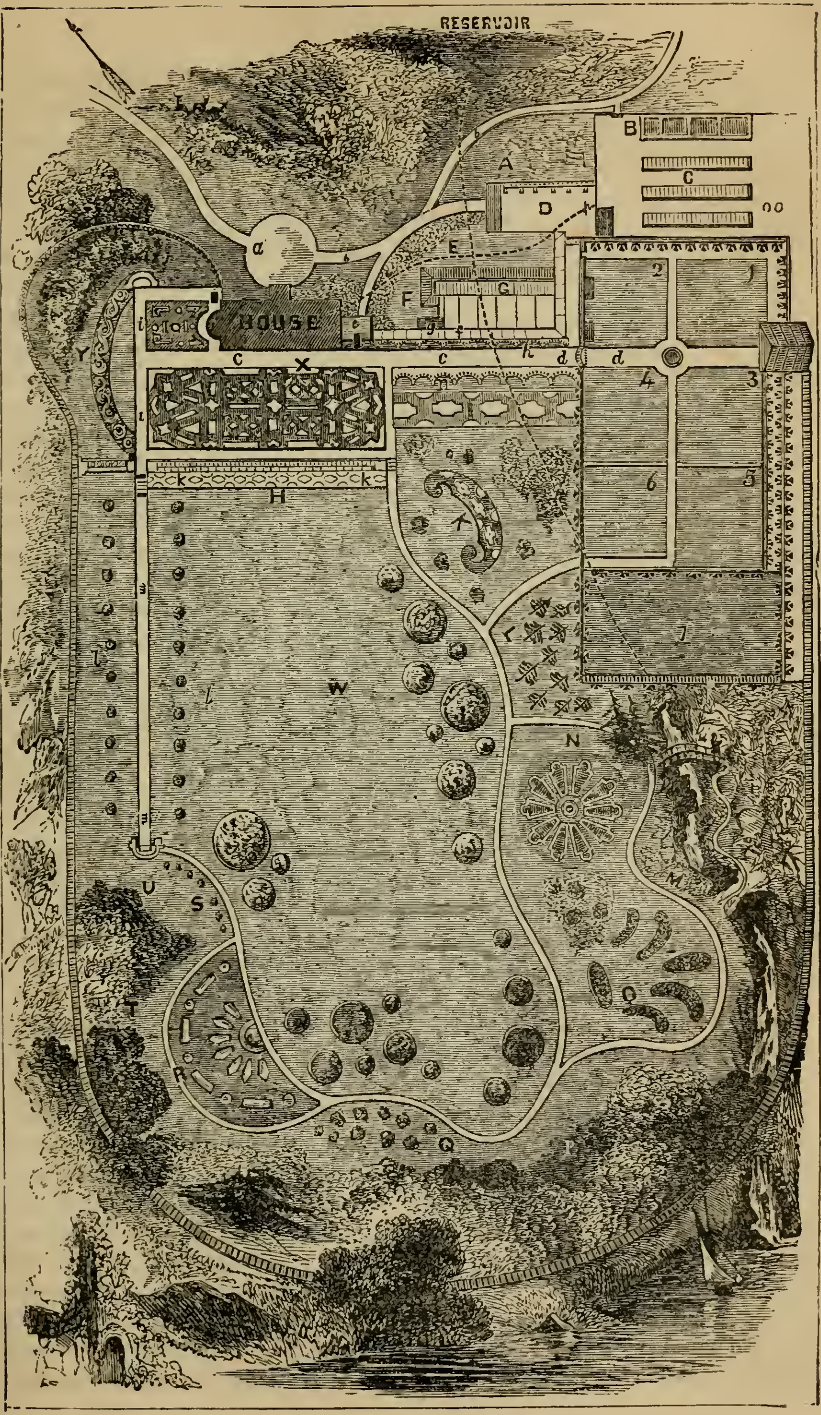
ten acres and a half. The entrance lies to the north, being approached by a sweeping drive from the north-west, through shrubberies on ground rising towards the north-east; so that it is well sheltered in that direction. The principal apartments look to the south and west, the circular windows looking out on geometrical flower-beds, margined with turf, and surrounded by a broad gravel path; while corresponding beds occupy the whole width of the lawn to the south, forming together a raised terrace round the house, from which flights of steps lead down to the lawn; a dwarf wall with balustrades and climbing roses supporting it. At the foot of this wall, a ribbon border, or a mixed herbaceous border, may be laid out with very good effect. From the north-west corner of the house, a broad belt of sloping lawn sweeps round the shrubbery, separated from the park by an iron wire fence. An elegant ribbon border facing the drawing-room occupies the front of this lawn, backed, at a little distance off, by a bank of choice rhododendrons, sheltered by a thick hedge of low-cut hollies. Beyond these the ha-ha fence admits an extensive prospect of the adjacent country.

131. Towards the south, the ha-ha fence stretches for about eight hundred yards in a south-easterly direction, giving a circular termination to the grounds, extending all round the inclosure; the details of the plan will, however, be better understood by the following references to it.

132. A, farmyard; C, frame-ground and reserve garden; B, sod-bins and manure-yard, with tank for the house sewage, led through the drain indicated by broken lines; D, stables; E, shady yard for plants in summer; F, kitchen entrance; G, forcing-houses; H, chain border; I, ribbon border and shrubs; K, ribbon beds and scrolls; L L, pinetum; M, heaths and ferns, with rockery in the rear; N, rosary; O, dahlias and hollyhocks in beds; P, syringas and other shrubs, with ruin and river behind; Q, American plants; R, verbena garden, trees and shrubs blending between them; S, clumps of Ghent azaleas; T, shrubs; U, elms, sycamores, and other forest trees; X, geometrical flower-garden, Y, ribbon border opposite drawing-room on the west; ZZ, clump of choice rhododendrons. *a*, carriage-drive 26 feet wide; *b*, road to stables and kitchen-gardens; *c*, gravel walk, 10 feet wide, extending across the grounds; *d*, garden gate of iron, with ornamental arch; *e*, conservatory; *f*, verandah, leading from conservatory to fruit-room; *g*, stokehole; *hh*, gravel walk, with arches of roses overhead; *ii*, broad gravel walks; *kk*, wall and balustrades, with ribbon border in front; *ll*, turf, with standard Portuguese laurels twenty feet apart; *mm*, terrace walk, with stone steps on the north, and alcove at the other extremity; *nn*, turf and Portuguese laurels; *oo*, reserve garden, dotted lines from reservoir in front of house indicating the course of the brook, which runs under the forcing-house and part of the grounds; *pp*, broken lines from kitchen to manure-yard, the sewers; Nos. 1 to 6 being the fruit and kitchen garden, and 7 the orchard.

133. Descending the steps adjoining the geometric flower-garden, a broad gravel path, ten feet wide, stretches, in a direction parallel with the ha-ha, for about two hundred and thirty feet, bordered on either hand with Portuguese laurels and other choice standard trees of a size, planted on the turf, and terminating in a circular alcove. Behind the alcove may be planted, or rather transplanted, so as to be regulated in size, some of the larger trees; such as elms, sycamores, and other forest trees. A broad sweeping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path leads off here in an easterly direction, bordered, on the left, by a series of circular beds, on the right by clumps of Ghent azaleas. A little onwards is a semicircular verbena garden, backed towards the south-west by choice shrubs and trees, through which vistas have been left, affording glimpses of the distant country; in the distance, a river flowing from west to east, the landscape dotted with farms, cottages, and occasional spires. Groups of American plants and syringas, backed and blending with the trees up to the ha-ha fence, occupy the south boundary. The main path, which is ten feet broad in its whole length, pursues its winding course back to the steps at the eastern extremity of the terrace, dotted on the left by the circular beds, varying only in size, and occasional clumps of shrubs; on the right by the dahlia and hollyhock garden and rosary, succeeded by the pinetum, where the more choice araucarias, deodars, and other pines are sheltered by the garden wall. Beyond the pinetum the lawn is decorated by an elegant ribbon border in a scroll, and dotted with choice deciduous shrubs, up to the dwarf wall of the terrace. An arch of roses, growing from each side, covers this part of the broad gravel path, which extends the whole breadth of the grounds, from the centre of the rhododendron-beds on the west, to the kitchen-garden on the east. Behind the roses a glass arcade or verandah leads from the conservatory attached to the east end of the house, to the kitchen-garden, passing in front of the range of forcing-houses.

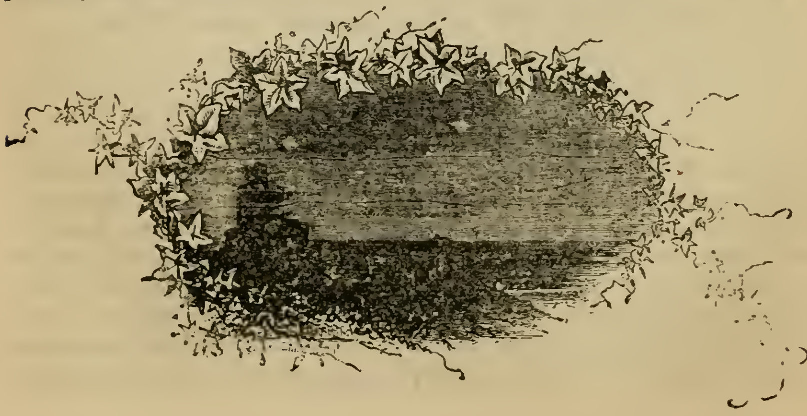
134. Farther to the east,—while the main path pursues a winding course back to the terrace, a secondary path winds through the shrubberies with a dahlia and hollyhock garden on the left, and choice syringas on the right. A little further on, on the left, is a formally-laid-out rose-garden cut in the turf, sheltered on the north and east by groups of American and other pines on either side of the path. Here the brook, which rises in the high ground to the north of the house, and which has been carried under the ground for some distance, issues from the orchard in a considerable stream, tumbling over artificial rocks placed here—a very pretty and very musical cascade; surrounded by rugged banks of rock-work, a fernery extending to the edges of the brook, and in front of the path a collection of hardy heaths.

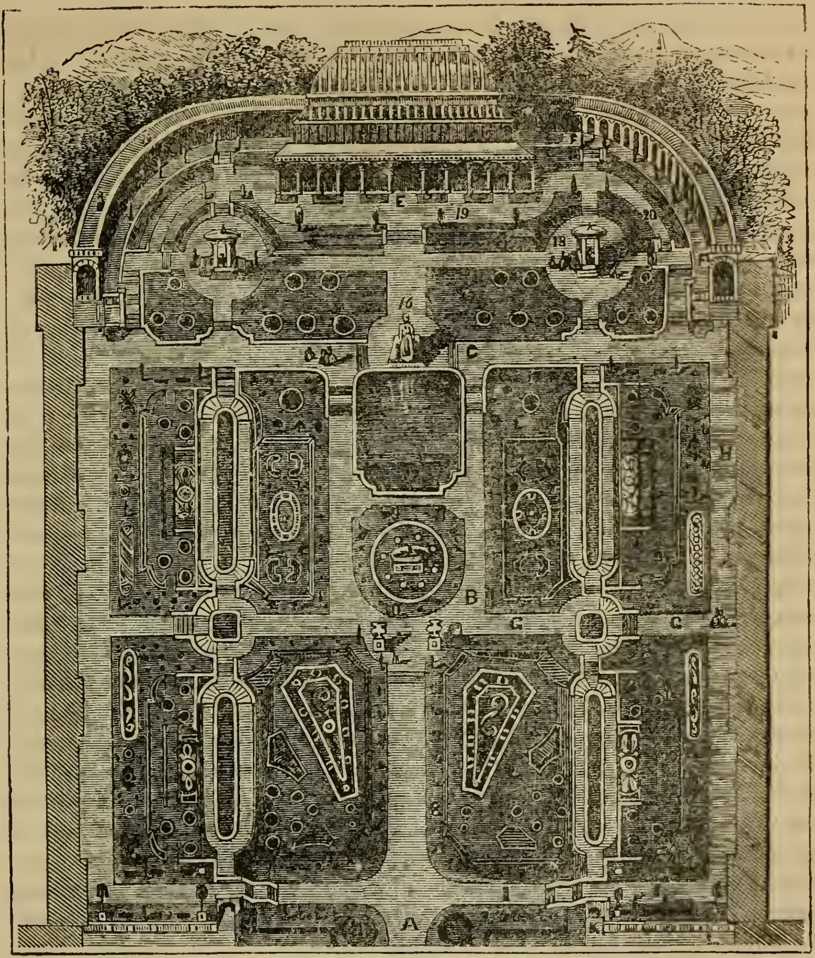
135. The ha-ha fence, which surrounds the whole area, proceeds as far north as the gardener's cottage, leaving a broad border outside the garden walls, on which some of the most choice fruit-trees are planted: the aspect being a south-east one, it receives all the benefits of the morning sun, and it is sheltered from the east winds by a belt of young trees outside, and a holly hedge planted on the top of the ha-ha inside. The orchard on the south side is protected by an efficient iron railing in place of a wall. On the west, the wall is a continuous one up to the broad gravel walk; and for the benefit of such disciples of Lucullus as may be visitors here, a fair sprinkling of choice fruit will be found on it in their season. The reserve garden occupies the slope north of the gardener's cottage, the manure-yard and farm-ground adjoining them; a sewer from the house, leading through the yard behind the forcing-houses and past the stables, conveys all the sewage both of house and stables to the manure-tank.

136. There can be no question that this principle of gradation is the true theory of laying out grounds, although the mode of its application may be infinitely varied. The geometrical style, for instance, may be carried on through a series of terraces, sloping banks, flights of steps of turf or stone, retaining walls, &c., until it occupies the whole of the inclosed lawn. Scroll-work patterns of box on gravel, the insterstices filled with broken red or white brick, Derbyshire spar, blue slate, coal, silver, yellow, or red sand, may also be introduced, as has been very successfully done in the Horticultural Society's Gardens at South Kensington. The geometrical garden may be formed on a level surface, and all fountains, steps, banks, and walls dispensed with; it may be raised above the surface, supported by stone edgings, or be sunk beneath it, which is an excellent arrangement where the height of the flowers would mar the effect of the more distant flower-beds. In fact, the geometrical style is capable of endless variation and the most facile adaptation; and, in addition to those here given, others might follow it in succession upon different levels, until the whole front lawn was thus furnished. The shape of these groups is of less importance than might be supposed, and could be altered every few years, to give fresh interest and variety to them. In all cases, however, where it occupies the whole of the inclosed space, the park, for a certain distance beyond, should be laid out in the gardenesque style. The boundary-walk should also be kept at the distance of from twenty to fifty feet from the fence which separates the lawn from the park. The practice of leading the walk within a few feet of the boundary, or fence, cannot be too severely reprehended. It not only makes the boundary-line offensively apparent, but compels the eye to travel along the bottom of an unsightly ditch. Some landscape gardeners recommend planting the inside edge of the ha-ha with choice shrubs or flowers; but this expedient only makes bad worse, by bringing the eye to admire beauty in juxtaposition with its opposite. The plants so placed will also appear in dangerous proximity to the foddering propensities of cattle. No pleasure can possibly be derived from seeing easily-injured objects placed in seeming danger, especially where the impression may be so easily avoided, and substantial advantages gained, by keeping the walks a sufficient distance from the boundary-line. Ideas of grandeur and extent may be imparted, and the boundary-line broken and almost hid by planting standard laurels or bays, and laying down clumps of choice shrubs on the intervening space, thus forming a foreground for other clumps planted on the gardenesque principle. The effect, as seen from the house and other parts of the grounds, should be to destroy entirely the sharp line of demarcation between lawn and park; to extend indefinitely the appearance of the former, and virtually include the latter, as far as the organ of vision is concerned. The more distant part of the park should then be planted and grouped on the picturesque principle, assuming in the extreme distance the rougher, bolder, and consequently more picturesque outlines of natural scenery. Upon the same principle, a place may be laid out entirely in the gardenesque style, the geometrical being entirely dispensed with. In this case, the

picturesque groups in the park should harmonize with the gardenesque groups on the lawn, and apparent extent and congruous variety be obtained. The picturesque style is only admissible beside Swiss cottages or rural residences, and can never be made to harmonize with the broad square outlines of any more imposing style of architecture. The worst possible arrangement is to surround the house with picturesque objects, with the highly-embellished geometrical garden farther off; and yet we sometimes see a tangled thicket of furze-broom, thorns, and brambles, up to the very door, with a ravelled skein of wild roses, sweet-brier, and honeysuckle peeping in at the windows; while the highly-dressed garden is placed entirely out of view. This arrangement, however romantic, is altogether opposed to correct taste, and incompatible with the comfortable enjoyment of either house or garden.

137. The practice of planting the park and lawn so as to constitute an indivisible and perfect whole, may be objected to, because it practises a deception on the eye of the beholder. Burke, on the other hand, remarks, "that no work of art can be great but as it deceives." Without contending very strenuously for the entire truth of this sentiment, it must be admitted that it is not only allowable, but one of the chief merits of Art, to conceal the modes by which its effects are produced. If it is apparent that a splash of white paint is used to represent water or moonlight in a landscape, the merit of the picture must be of the most mediocre description. When we look at a good painting, we think nothing of brushes, easels, and colours, but only of the marvellous beauty and truthfulness to nature of the representation. The canvas speaks, but it speaks to us only of light and shade; of depth, softness, and intensity of tone, and apparent extent, which are all admired; but the mode of their production is concealed. Bald, bare outlines and sharply-defined boundaries are hidden on canvas by a dash of paint, and in the natural landscape by a group of shrubs and trees; and the latter deception, if such it can be called, is as consistent with the highest principles of artistic taste as the former. While, therefore, an occasional boundary-line, where the prospect is commanding, may be visible, as a rule, it should be at least partially concealed.—D.T.F.





GARDEN AND CONSERVATORY OF THE ROYAL HORTICULTURAL SOCIETY.

CHAPTER VI.

LAYING OUT GARDENS

138. SOME of our readers may remember Gore House, Kensington, when the presiding deities of the place were the beautiful and accomplished Countess of Blessington and the fashionable Count D'Orsay, whose claim to be a leader of fashion was the smallest of his merits. Its portals were never closed to those who could wield pen or pencil, or had other claim to distinction; and, among other *habitués* of the place, some will remember a moody-looking and somewhat silent individual, who was looked upon as not very bright by those who met him casually. Alas for poor humanity!—the beautiful, the kind, and the

generous sleep the sleep of death in a foreign grave ; and the moody man sits on an imperial throne, and sways the destinies of a great people,—we had almost said of the world. But with this we have no concern,—*sub umbra vitis sui,*—under the shadow of our own vine, let us see to our fruit-trees and flower-beds. The grounds of Gore House were of no great pretensions as a garden, but its lawn and flower-beds were wonderfully attractive ; it had the settled aspect of an old place, where everything was attended to without much display ; the walks were well kept, shady, and winding, and some beautifully-arranged groups of trees—arranged, however, more by Nature than by Art—gave a park-like appearance to its moderate extent. The trees themselves gave an ancestral appearance to this model of suburban residences.

139. Many more of our readers will remember the grounds in 1851, when the popular and good-humoured Adolphe Soyer was its Amphitryon. The changes he made were slight in themselves, but they must have conveyed a shock to many who remembered the house and grounds as the perfection of elegance. The star-spangled saloons and Sun Chamber of the fantastic Frenchman were a sad desecration of the elegant drawing-room and boudoir of the beautiful countess, —the bizarre statues and fantastic fountains poor substitutes for the broad walks and dignified ancestral trees of the former period.

140. Another epoch in the history of this piece of ground will be remembered by many as well as ourselves,—the morning when the knell was rung by the axe at the roots of these trees. Down they went, not exactly in their "pride of place," for they had lost many of their charms ; but one feels the fall of trees as a sort of *admontio mortis.* Then the stalwart navvy made his appearance in these grounds, sacred to the Muses ; deep trenches were opened all over its surface, and mysterious-looking pipes of crockery were scattered about, which gradually disappeared in the bowels of the earth ;—the water, which the fantastic tastes of M. Soyer had trained into so many bizarre conditions, was sent underground. The contractor's cart next made its appearance, and "matter" which the improver said was in the wrong, was conveyed to the right, place. Slow but sure, like destiny, the contractor's cart moved along, adding its freight to other accumulations, and shapely terraces began to show themselves ; and then came the external walls, now forming the backs of the corridors, and the scene, which had its own peculiar interest for us, was shut out from our view, to burst upon it another day in all its glory of sloping banks, geometric flower-beds, terraced esplanades, shady arcades, architectural canals and basins, and, by-and-by we shall have to add, gushing cascades ; for this spot is the site fixed upon for the ornamental gardens of the Royal Horticultural Society.

141. No spot could have been selected more suitable for a town, or rather suburban garden, than the garden-grounds attached to Gore House. The portion appropriated to the Horticultural Society, which is three-and-twenty acres, stretches away to the south 1,200 feet, by about 800 at its southern extremity, sloping gently to the south, with a fall of 20 feet in its whole extent. The soil and subsoil were of the most favourable description ; the former a rich

black earth of considerable depth, similar to that of the market gardens of the neighbourhood; the subsoil, the gravel of the district, mixed in some places with a little clay. Being surrounded by houses, or building-sites for houses, somewhat palatial in character, the formal, or geometrical, garden was probably the only style admissible; that, however, was rendered imperative by the decision of the Commissioners of the Exhibition of 1851, to whom the land belongs; they determined that the gardens should be architectural, undertaking themselves to erect all the permanent buildings.

142. The natural inclination of the ground greatly facilitated the formation of the terraces. The ante-garden at the south extremity, an oblong square of 800 feet by 400, occupies the lower level,—the earth taken from its more elevated part served to form a raised bank of a foot and a half along its whole breadth. This second level extends for about 300 feet at this level, when another rise of two feet occurs,—broad raised verges 12 feet wide all round, and sloping ramps leading by a grass promenade to the gravel walks round the canal, at the same level as the ante-garden, with their embroidered flower-beds and evergreen clumps and scrolls. Another space of about 360 feet, and a third rise of five feet occurs, which is attained by two flights of steps on either side of the basin. The gardens on this third level bring before the spectator much of the architectural display of the place, and lead to the fourth level by three flights of steps in the path and grassy slopes in the grounds. The conservatory terrace is attained by an additional flight of steps and grass ramps. It is not necessary to follow the workmen in the various steps by which the grounds were levelled and the embankments made good; it is obvious enough that the several excavations were made, and the nearest earthworks raised by the material removed in excavating, the surface soil, a fine friable loam, being reserved for the surface of the sloping banks and level ground.

143. The system of surface-drainage, and the arrangements for watering, are of the most complete description; a deep drain, laid with 18-inch glazed pipes, cemented at the joints, runs under the central cross-walk of the ante-garden, receives all the surface drainage, and communicates with the sewer in the adjoining street. Two other main drains, laid with 12-inch glazed pipes, traverse the gardens from north to south on each side of the central walk, about 80 feet apart. Two other drains, parallel with these, laid with 9-inch pipes, run down the side of each corridor, outside the gravel, entering the main drain in the ante-garden. Into these main drains, lateral drains, with pipes of 4 or 6 inches diameter, according to the extent of surface they have to drain, collect and lead the surface-waters over the whole area; these smaller pipes being jointed with clay or cement, and having elbow-joints for the reception of other pipes, which ramify in a different direction.

144. The arrangement for distributing water is equally efficient; a well, in course of sinking, is already 300 feet deep. This is to supply the basins when completed. The water will be raised by an engine behind the conservatory; iron pipes, of the largest calibre, convey the water to a reservoir

under the Exhibition Memorial, from which it empties itself over a cascade 18 feet wide and 11 feet high, into the large basin; from this basin it flows into the smaller basins between the two canals, on either side, by pipes laid on to the right and left of the basin. From these the two canals on each side are filled, and their overflow led back by pipes placed at a proper level, and again emptied into the well, while plugs in the bottom permit of their being entirely emptied in the same manner. Other pipes continue the water-supply to the bottom of the gardens, where arrangements exist for turning the central tazza into a basin for nymphæ and other water-plants at a future time. The whole gardens are also traversed by smaller pipes arranged with plugs, by means of which, and the application of hose to them, the whole ground can be efficiently and economically watered.

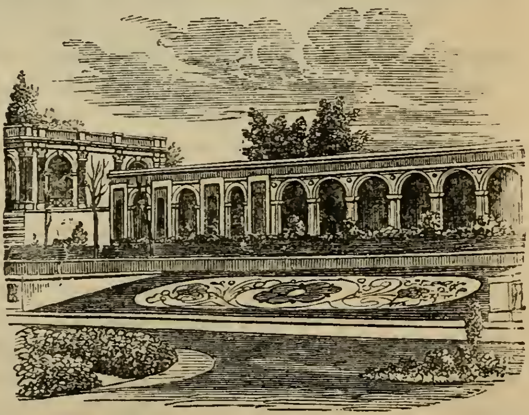
145. The walks, which traverse the gardens are equally perfect as models of workmanship and design, forming noble promenades round the whole area, with a broad central path and cross-walks at convenient distances: they are made of the subsoil gravel excavated for the canals and sunken grass promenades. The central and principal cross-walks are throughout 40 feet wide, with the slightest possible curve in the centre, which is on a level with the side verge of turf. They were excavated to the depth of 18 inches in the principal walks, and 9 inches of brick-and-lime rubbish laid down and heavily rolled in. After settling a short time, 6 inches of coarse gravel was laid down, and a further layer of finer gravel added as a finish, and the whole well rolled. The cross and corridor walks, about 20 feet wide, contain 9 inches of brick-and-lime rubbish and 6 inches of gravel, applied in the same manner. Neat iron gratings, at regular distances, receive and convey the rain-water into the nearest drain-pipes. The earthworks, ramps, and glacis, being all formed according to the design laid down by Mr. Nesfield, and the principal architectural works completed, early in this year of grace 1861, the ancient turf, which had been carefully preserved, was again laid down; and the excellent quality of the soil is shown by the smooth and healthy appearance the ramps and glacis now present in all directions.

146. If there were any among those who accepted the invitation of the Council of the Horticultural Society, in June last, having old associations with the place, great must have been their surprise at the alteration a short year had produced. The first impression which a rapid glance conveys is not entirely satisfactory: the eye wanders over the whole ground, having no resting-place; for the dazzling newness of the architecture leaves it without repose; the trees, only recently transplanted, are insufficient as yet to cover the nakedness of the walls and terraces. The broad Byzantine arches of the corridor, and the two slender twisted columns which support them, give an oriental aspect to the gardens, which is increased by the style of the conservatory, which glitters through the present scanty foliage.

147. The entrance from the Prince's Road, which may be accepted as still incomplete, opens upon the ante-garden, a space of ground about 800 feet by 400, including the corridor, laid out very simply, in four oblong compart-

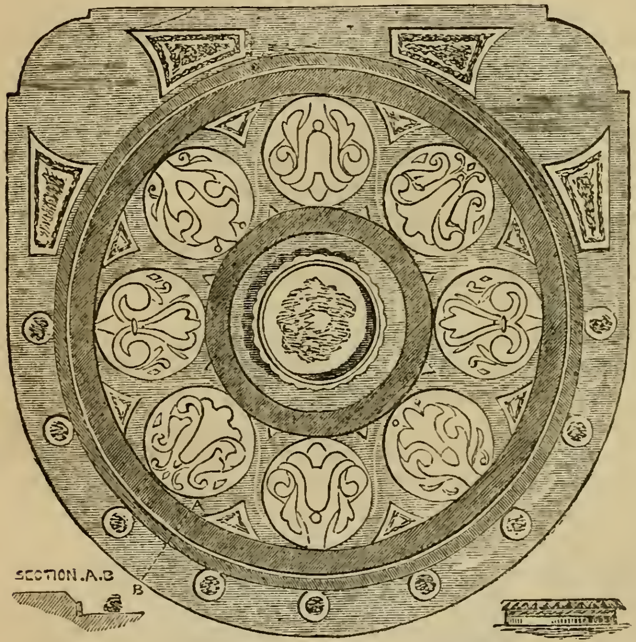
ments. Descending from the corridor, which is here inclosed by glass, a broad flight of steps leads to the central path, which intersects the lowest level of the gardens. The compartment on the right is occupied by three rows of choice deciduous trees and American pines, skirted under the retaining wall on the north by an irregular clump of rhododendrons. The compartments run off at an obtuse angle, leaving room for an octagon-shaped compartment in the centre of the walk, of 70 feet. a circular basin occupying its centre, filled with scarlet geraniums, out of which rises an elegant tazza for flowers. The two compartments under the south corridor are intended for rock-works; the further compartment on the right is laid out as a maze, and planted with yew and hornbeam. At each extremity of the ante-garden, as this is called, a gravel walk, under the retaining wall of the first terraces, enters the principal garden beneath the bridge to the walk alongside the canals, which is on the same level as the ante-garden.

148. Keeping to the central path, however, a gently sloping bank of a foot and a half in the turf, with a similar rise in the gravel, leads to the principal garden. From this spot the best view of the terraces and conservatory is obtained. The cross-walk on either hand looks across the bridge and terrace upon the most ornamental façade of the principal corridor; and the front view shows the ascending steps at the middle and end of the central walk, terminating in the circular embroidery garden and the large central tazza. Beyond it, in due time, will appear the grand cascade, which is to supply all the other basins, surmounted by the memento of the Great Exhibition, on which Mr. Durham is now occupied; the conservatory beyond, with the steps, and the principal architectural terraces, rising on the right and left of it, closing the view.



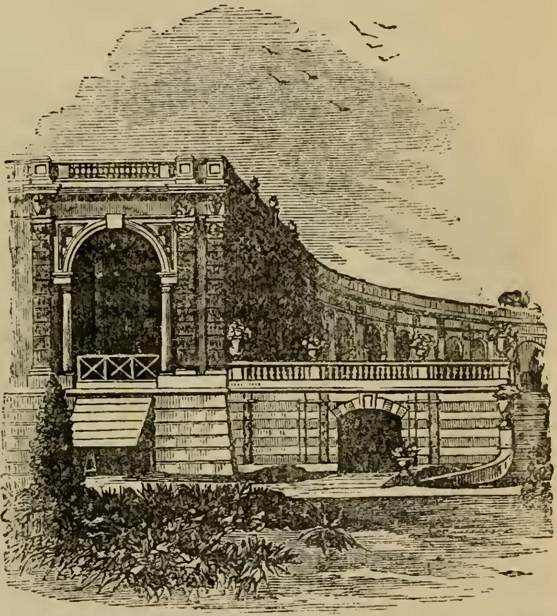
149. On the immediate right and left, a broad verge of twelve feet, is planted with Portuguese laurels, thirty feet apart, descending by grass ramps of three feet, leads to a grass promenade and a sunken diagonal flower-bed, surrounded by a 6-inch stone kerb, arranged in a very elegant embroidery pattern of dwarf box and variously-coloured paths of red, buff, blue, black, white, and yellow,—geometrical beds of shrubs and low-growing trees, planted singly, which form a distinguishing feature in the garden, occupying the further extremity of the compartment. Beyond the trees, another grass ramp leads down to the level of the canal. The opposite bank of each

of the canals—a sloping glacis supported on the north and south by the retaining walls of the terraces, as represented in the engraving, forms a series of flower-beds in the garden; the design is very perceptible in the engraving, but their rich combination of colours requires to be seen to be appreciated; the colours of the flowers blending, in a manner highly creditable to the taste of the manager, with the dark green tracery of dwarf box and varied colours of the alleys. At the northern extremity of the diagonal flower-bed another ramp and broad flight of steps leads to a higher level in the principal garden, with a central cross-path, terminating on each side in the square basins, from which the canals are supplied. Ascending stairs here lead to the middle corridor walk by a double flight of steps, with retaining walls and balustrades. Directly in front of the steps, looking up the central path, a nearly square compartment presents itself, the corners cut off at an obtuse angle by the path which travels round it; an embroidery pattern, chiefly of circles, occupies its centre, inclosing a circular basin or tazza for scarlet geraniums: this compartment is, perhaps, the most massive series of flower-beds in the garden. The external verge forms a grass border, 8 feet 6 inches wide; inside is a sloping bank of 9 inches, and another verge in turf of 1 foot 6 inches is supported by a kerb of Portland stone. Within the kerb is an alley of broken chips of red brick, 3 feet 9 inches wide, the walk and flower-beds being sunk 6 inches more. The outer circle of the beds is surrounded with white stone, in chips; the inner circle, buff; the corners filled with blue. The centre is occupied by a basin, surrounded by a massive circle of flowers. The main design is a series of eight circles, in various patterns, which are here imitated as closely as the small scale of our drawing will permit. The central walk being divided by this compartment, leads to the foot of the third terrace, which is ascended by two flights of five steps each,



leading to the lower terrace, F. A third flight of steps leads to the second terrace, on which the sculpture Memorial of the Exhibition of 1851 is to be placed. From this terrace sloping ramps and flights of steps lead to the third or conservatory terrace, H, the grass compartments on each side being appropriated to choice trees and shrubs, and a covered platform on either hand for bands of music.*

150. The conservatory itself will probably be provocative of discussion; about its originality and general harmony with the corridors there will be no dispute. The arcade, or rather verandah, which surrounds it on three sides, is both graceful and useful, as shelter to the visitor from sun and rain; the retaining walls and balustrades highly ornamental, and the flower-beds between the steps excellently designed, as is the interior of the house for exhibition purposes; but it may be doubted how far so lofty a house will grow the permanent plants and trees to be placed there. The circular corridor and terrace, K, on a level with it, start from the northern walls of the conservatory. From this terrace two long flights of steps lead to the terrace on which the band-houses are stationed, and by a third flight to the terrace F, from which another flight leads to the walk round the canals at



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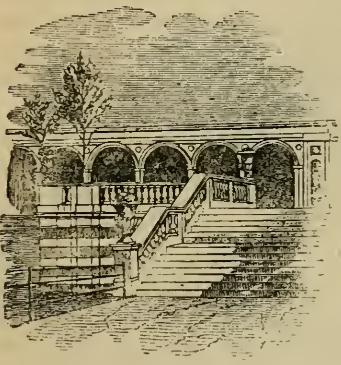
* In the plan at page 81, A is the centre walk to principal garden.—B. Branch walk to Conservatory terraces.—C. Lower or first Terrace.—D. Second Terrace.—E. Third Terrace.—F. Upper Terrace on a level with Upper Corridor.—G. Centre cross-walk from East and West Corridors.—H. Middle Corridor Walk.—I. South cross-walk of principal garden.—K. Walk under the Bridge leading through the lower Corridor of Ante-garden.—L. Walk from North to South lower Corridor.—1. Basins.—2. Diagonal cross Promenade (reached by Grass ramps).—3. Large compartment for flowers and box embroidery.—4. Mass of very low shrubs.—5. Group of low trees.—6. Shrubs of medium height.—7. Avenue of spiral evergreen shrubs.—8. Standard Portugal Laurels on the verges, which latter are 15 inches above the surface of compartments and promenades.—9. Circular compartment for flower-beds and box embroidery.—10. Standard Roses.—11. Dwarf evergreen shrubs.—12. Large Basin with Cascade, the latter 18 feet wide and 11 feet high.—13. Compartment for flower-beds (without embroidery) accompanied by, 14, Groups of flowering shrubs, &c.—15. Standard Rhododendrons.—16. Memorial Sculpture for Great Exhibition of 1851.—17. Large trees.—18. Band-houses (East and West) on circular paved platforms.—19. Kerbed Beds for flowers between steps to Conservatory Arcade.—20. Belt of shrubs.

the lowest level of the garden. These canals, two on each side, 175 feet in length and 18 in breadth, are about 30 inches deep; they are formed on four layers of tiles laid in Portland cement, over a bed of concrete 10 inches deep; a thick bed of Portland cement is laid over all, surmounted by an elegantly-moulded coping of Portland stone, projecting slightly over the sloping banks, and rising six inches above the level of the paths. A square basin at each end of the central cross-walk, and at a higher level than the canals, occupies the space between them, receiving the water from the great basin and supplying them. Round this basin the walk proceeds, terminating in a flight of steps leading to the middle corridor walk.

151. The corridors, like the gardens, lie at different levels, each being also distinguished by its peculiar architecture. The circular corridor, adjoining the conservatory, is the most highly decorated, the capitals of the columns having sculptured on them fruits and flowers, with the names below coloured in a neutral brown tint,—not, in our opinion, in very good taste.



152. The façade of the middle corridor is simply an obtuse elliptic arch in red brick, with rough granite capitals.

153. The corridors of the ante-garden, which seem intended for inclosure by glass, are supported on slender twisted terra-cotta pillars, which give what is, we presume, intended,—a Byzantine character to the style of the whole of the architectural decorations.

154. The general effect of these gardens cannot fail to exercise a beneficial influence on the art of laying out ornamental flower-gardens. While the terraces and arcades are felt to be oppressive from their freshness, the reverse is the case with the arrangement of the beds; the tracery of some of these is of the most brilliant colouring, but the elegant lines of the clumps, and the presence of occasional patches of dwarf box, in the design, agreeably subdue the blaze of colour. Beds and clumps of dwarf evergreens, shrubs, and also single trees, are agreeably interspersed among the beds in geometrical forms, and clumps, and scroll patterns, producing the richest effects.

155. There are other gardens, chiefly derived from the Italian school, where much of the beauty immediately surrounding the house is derived from architectural display. In some parts of the Continent where the orange is cultivated, those noble plants, in their massive square tubs, form a grand and appropriate decoration to terrace-walks. The glacis at Glammis Castle and the terraces of Powis Castle, and many other equally beautiful specimens of terraced garden style of gardening, fell before the improvers of last century, giving place to the more tame, undulating, turfy sward and serpentine walks—the gem, as it were, without the setting. But many noble specimens were

spared, and others have been since added, the terraced gardens at Windsor Castle presenting no insignificant example.

156. The old gardens thus immolated to the rage of fashion were generally laid out so as to correspond with the main lines of the building, and no doubt architectural unity requires that this should always be the case, but it is not always necessary to terrace effects that architectural decorations should be introduced; simple embankments of a noble character, blending most happily with the surrounding landscape, may be produced by very simple means. The engraving at page 48 represents a portion of the Papal Gardens of the Belvedere behind the Vatican, which is elegant in its simplicity. The geometric figures are produced by deep box edgings, and the symmetrical effects given to the variety of elevation by the embankment, "are evidences, says Mr. Humphreys, "of true feeling for the gardenesque in the designer." The effects to be produced by deep box edgings have been revived with excellent effect in laying out the Horticultural Society's Gardens at Kensington, and the general effect of sloping banks and terraces without too much elaboration may also be observed in the elegant structures in these gardens, which are now rapidly approaching completion.

157. Among the garden arrangements we have had occasion to consult, we have met with few descriptions so perfect as the following, which we abbreviate from the "Carthusian," a work which probably few of our readers have seen. "My garden," says the writer, "is south of the house, the ground gradually sloping for a short distance till it falls abruptly into the tangled shrubberies. A broad terrace runs along the southern length of the building, extending round the west side also, for I would catch the last red light of the setting sun. Musk and Noisette roses and jasmine must run up the mullions of the oriel window, and honeysuckle and clematis, the white, purple, and blue, climb round the top. The upper terrace is strictly architectural; no plants are to be found there. I can endure no plants in pots—they are like birds in a cage. The gourd alone throws out its tendrils, and displays its green and golden fruit from the vases that surmount the broad flight of stone steps that lead to the lower terrace; while a vase of larger dimensions and bolder sculpture at the western corner is backed by the heads of a mass of crimson, rose, and straw-coloured hollyhocks, that spring up from the bank below. The lower terrace is of the most velvety turf, laid out in an elaborate pattern in the Italian style. Here are collected the choicest flowers of the garden in masses,—the purple gentianella, the dazzling scarlet of the verbena, the fulgent lobelia, the bright yellow and rich brown of the calceolaria, here luxuriate in their trimly-cut parterres, and

'Broider the ground
With rich inlay.'"

158. It will probably occur to the reader, from this description, that costly works are necessary to garden decorations. Let us hear the practical Mr. Noel Humphreys on this subject:—"I think," he says, "that even a simple turfed embankment, surmounted by a low cut hedge, formed of some

hardy evergreen shrub, cropped very square, and flat at the top, might, either with or without the addition of a single flight of steps and with a few appropriate pedestals and vases, be sufficient to produce much of the desired effect. In accordance with the more irregular and picturesque forms of cottage architecture, the terrace might be guarded by balustrades of simple rustic work or branches. Even a rustic cottage requires to be accompanied by a moderately broad esplanade or terrace on its principal side, which, however, does not absolutely require expensive architectural embellishment; a neatly turfed embankment, raised a few feet above the surrounding garden, suggests the idea, even in that simple form, that a sufficiently high situation has been selected, and gives a pleasing air of propriety to the site of the dwelling. First, it suggests that a sufficiently high situation has been selected; secondly, that an amply sufficient space has been prepared for the erection of the building, and by its means is carried beyond the mere form of the house itself, in a manner that causes its vertical and horizontal lines to blend by degrees with the outline of the surrounding vegetation and the undulations of the ground." With a trifling increase of expense, also, a rustic and somewhat more architectural approach might be given to this terrace, as shown in the sketch at the end of this chapter.

159. Let us return, however, to our Carthusian's garden scheme, and, leaving the "mass of gorgeous colouring and the two pretty fountains that play in their basins of native rock on either hand, descend the flight of steps, simpler than those of the upper terrace, and turn to the left hand, where a broad gravel walk leads to the kitchen-garden through an avenue, splendid in autumn with hollyhocks, dahlias, China-asters, nasturtiums, and African marigolds.

160. "We will stop short, however, of the walled garden to turn off among the clipped edges of box and yew and hornbeam which surround the bowling-green, and lead to a curiously-formed labyrinth, in the centre of which, perched on a triangular mound, is a fanciful old summer-house, with a gilded roof that commands the view of the whole surrounding country. Quaint devices of all kinds are found here, for the garden is an ancient one, to which modern improvements have been added. Here is a sundial of flowers arranged according to the time of day at which they open and close. Here are peacocks and lions in livery of Lincoln green. Here are berceaux and arbours, and covered alleys and inclosures, containing the primest of the carnations and cloves in set order, and miniature canals, that carry down a stream of pure water to the fishing-ponds below. Farther onwards, and up the south bank, winding towards the house, are espaliers and standards of the choicest fruit-trees. Here are strawberry-beds, raised so as to be easy for gathering; while the round gooseberry and currant bushes, and the arched raspberries, continue the formal style up to the walls of the inclosed garden, whose outer sides are clothed alternately with fruits and flowers, so that the 'stranger within the house' may be satisfied without being tantalized by the rich reserves within the gate of iron tracery, of which the gardener keeps the key.

161. "Returning to the steps of the lower terrace: what a fine slope of green

pasture loses itself in the thorn, hazel, and holly thicket below, while the silver thread of the running brook here and there sparkles in the light. And how happily the miniature prospect, framed by the gnarled branches of those gigantic oaks, discloses the white spire of the village church in the middle distance; while in the background the smoke drifting athwart the base of the purple hill, gives evidence that the evening fires are just lit in the far-off town. At the right-hand corner of the lower terrace the ground falls more abruptly away, and the descent into the lawn, which is overlooked from the high western terrace, is by two or three steps at a time, cut out in the native rock of red sandstone, which also forms the base of the terrace itself. Rock plants of every description grow freely in the crevices of the rustic battlement which flanks the path on either side; the irregularity of the structure increases as you descend, till, on arriving on the lawn below, large rude masses lie scattered on the turf and along the foundation of the western terrace.

162. "A profusion of the most exquisite climbing roses, of endless variety, here clamber up till they bloom over the very balustrades of the higher terrace, or creep over the rough stones at the foot of the descent. Here, stretching to the south, is the nosegay of the garden. Mignonette, 'the Frenchman's darling,' and the musk-mimulus, spring out of every fissure of the sandstone; while beds of violets—

> 'Strew the green lap of the new-come spring,'

and lilies of the valley scent the air below. Beds of heliotrope flourish around the isolated blocks of sandstone; the fuchsia, alone inodorous, claims a place from its elegance; and honeysuckle and clematis, of all kinds, trail along the ground, or twine up the stands of rustic baskets filled with the more choice odoriferous plants of the greenhouse. The scented heath, the tuberose, and the rarer jasmines, have each their place here; while the sweet-brier and the wallflower, and the clove and stock gilliflower, are not too common to be neglected. To bask upon the dry sunny rock, on a bright spring morning, in the midst of this 'wilderness of sweets,' or on a dewy summer's eve to lean over the balustrade above, while every breath from beneath wafts up the perfumed air—

> 'Stealing and giving odour,'

is one of the greatest luxuries in life.

163. "A little farther on the lawn, are the trunks and stumps of old pollards hollowed out, and from the cavities, filled with rich mould, climbers, creepers, trailers, and twiners, of every hue and habit, form a singular and picturesque group. The lophospermum, the eccrymocarpos, the maurandia, the loasa, the rhodochiton, verbenas, and petunias, in all their varieties, festoon themselves over the rugged bark, and form the gayest and gracefullest bouquet imaginable; while the simple and pretty snapdragon weeps over the side, till its tiny pink threads are tangled among the feathery ferns that fringe the base of the stump.

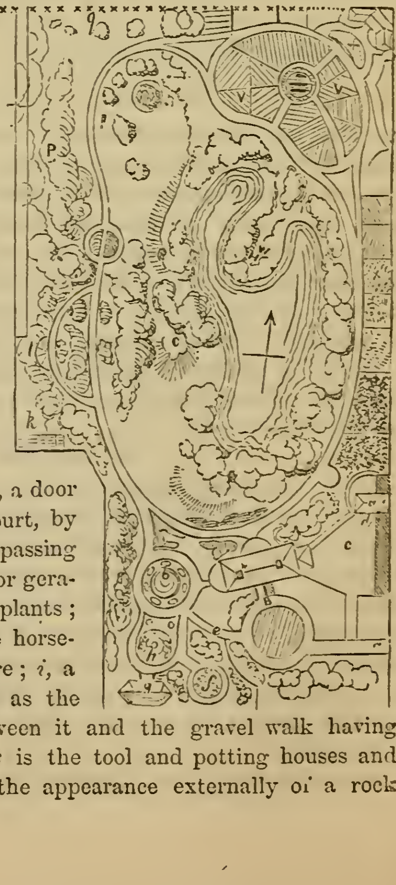
164. "The lawn now stretches some distance westward, its green and

velvet surface uninterrupted by a single shrub, till towards the verge of the shrubberies, into which it falls away in irregular clumps of evergreens and low shrubs, which break the boundary-line of greensward. Here are no borders for flowers, but clusters of the larger and bolder kinds, as hollyhocks and peonies, rise from the turf itself. Here, too, in spring, golden and purple crocuses, daffodils, aconites, snowdrops, bluebells, cyclamen, wood-anemones, hepaticas,—the pink and the blue,—chequer the lawn in bold broad strips, the wilder sorts being more distant from the house, and losing themselves under the dark underwood of the adjoining coppice. The ground here becomes more varied and broken, clumps of double-flowering gorse,

> 'The vernal furze,
> With golden baskets hung;'

the evergreen barberry, the ilex, in all its varieties, hardy ferns bordering the green drive which leads to the wilder parts of the plantations."

165. This is, of course, a pleasure-garden of considerable pretensions, embracing not less, perhaps, than three acres, and it may be much more. Mr. Loudon, whose authority is great on such questions, describes and figures, in his "Farm and Villa Architecture," a garden laid out by an architect for his own use; which, considering the size of the villa, and the extent of the accommodation afforded, exceeded anything of the kind he had met with. The land inclosed was two acres and a half, extending longitudinally from north to south, so that it would be, judging from the plan, 200 yards from east to west, and 110 from north to south. "In this plan *a*, on the north-west, is the main entrance; *b*, the entrance portico of the house; *c*, the kitchen and stable-yard; *d*, the stable and coach-house; *e*, a door in the hall, bounding the entrance-court, by which the grounds are entered without passing through the house; *f*, a circular bed for geraniums and other showy greenhouse plants; *g*, a billiard-room; *h*, a rosary in the horse-shoe form, having a dial in the centre; *i*, a marble basin with a bronze fountain as the centre, the space of turf lawn between it and the gravel walk having beds of choice herbaceous plants; *k* is the tool and potting houses and working sheds; *l*, a grotto, having the appearance externally of a rock



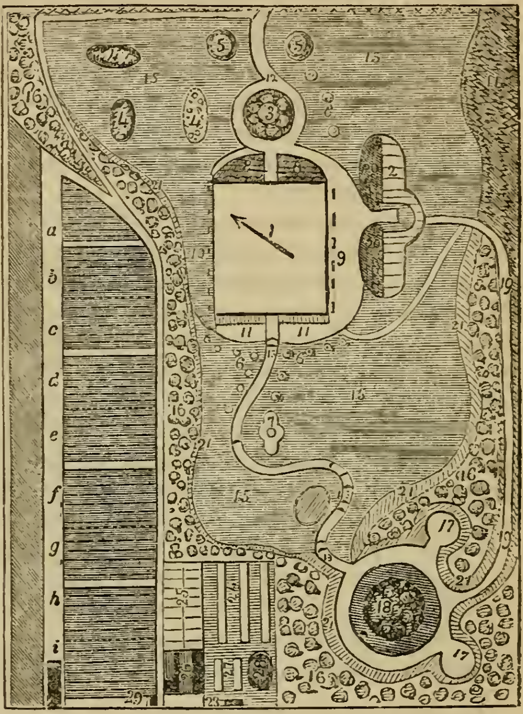
covered with ivy and creepers; *m*, a clump of American plants with ornamental vases, statues, and pedestals; *n*, a collection of choice herbaceous plants; *o*, a wooded knoll, having an open grove of pine-trees on the summit; *p*, shady grass walks; *q*, a wire fence on the top of a concealed wall, or ha-ha; *r*, wall and fruit border facing the south; *s*, gardener's cottage; *t*, a plot for aromatic herbs; *u*, melon-ground, sunk three feet beneath the general surface, and surrounded by a box hedge; *v*, the kitchen garden; *w*, a piece of rock-work projecting into the lake, and covered with creepers and rock-plants on the west side; *x*, a fruit-wall and border, with western aspect; *y*, an octagon arbour or summer-house, in the centre of which the proprietor has placed a magnificent vase from the antique; *z*, a descent of three steps from the drawing-room to the garden.

166. The objects attained by this arrangement of the ground are, the utmost amount of space for exercise within the wall, with as much of variety and privacy as was consistent with views of the surrounding scenery, and the usual supply of fruit and vegetables. The more choice peaches and nectarines are placed on the wall *r*, which has a due south aspect; the wall *x*, with a western aspect, being covered with choice figs, apricots, and the more choice cherries, plums, and pears; apples, pears, plums, and cherries being also distributed through the grounds, as standard trees, along with some walnut, sweet chestnuts, mulberries, quinces, medlars, and service trees. Mr. Loudon's objection to this design, which, however, he considered almost perfect, was, that the lines were too formal and unbroken, and he proposed to remedy it by substituting for the defined margin of the American clump *m*, the same plants, the lines being gradually lost on the turf, and by the introduction of more formal-shaped beds. At *z*, the kitchen-garden, he considered a necessary evil, having no beauty as such, but placed so as to interfere as little as possible with the area of space sought to be created.

167. Hitherto our attention has been directed to gardens of considerable extent: we now propose, with Mr. Chitty's assistance, to deal with a single acre of land, which is to include house and offices as well as garden.

168. Here much the larger portion is usually devoted to lawn, flower-garden, and shrubberies, say two-thirds, which leaves one-third for the kitchen-garden, exclusive, we will suppose, of melon-ground. The latter ought to be about twenty yards square, walled or fenced round to the height of six feet, with a gateway leading into it large enough to admit a horse and cart. The drainage of the melon-ground should be perfect, the water from the pits and houses falling into a tank placed sufficiently deep in the ground to receive all the drainage from the dung-beds and compost-heaps. If this tank is within the kitchen-garden, it will be an advantage, being invaluable in the cultivation of flowers and vegetables. Here also are placed the potting-sheds, and sheds for the preparation of composts, which should always be prepared under cover; and as the yard is by no means ornamental, it should be placed as far as possible from the house.

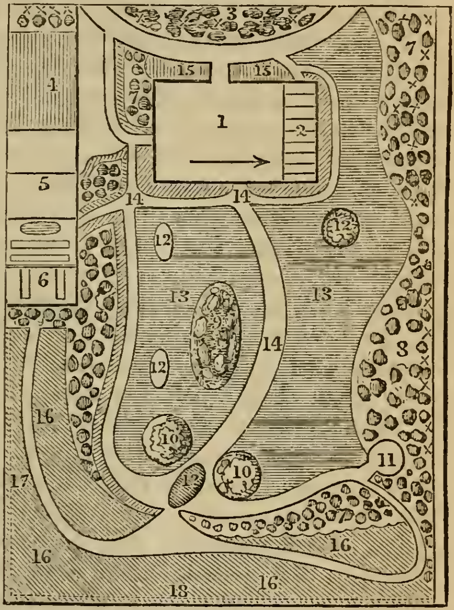
169. In the plan, 1 is the house; 2, the conservatory; 3, clump of American plants, consisting some of rhododendrons, ledums, and heaths; 4, roses; 5, flower-beds, with coniferæ in the centre; 6, flower-beds; 7, jardinette, with fountain; 8, borders planted with Alpine plants; 9, vines or ornamental climbers; 10, pears, cherries, &c. trained against the wall; 11, verandah with climbers; 12, carriage-drive; 13, arches over path for climbing roses, and other ornamental climbers; 14, fernery; 15, turf lawns; 16, shrubberies; 17, summer-house; 18, flower-beds, with deodars in the centre, surrounded by turf; 19, shady walk; 20, flower-border fronting conservatory; 21, flower-border fronting shrubberies; 22, melon-ground and compost-yard; 23, back entrance, wide enough for carts to enter; 24, range of three forcing-pits; 25, vinery and forcing-house; 26, tool-house; 27, frames; 28, manure-bed; 29, garden entrance. The kitchen-garden being thoroughly drained, trenched, and manured, and the walls in order, the following will be its first order of cropping:—*a*, Jerusalem artichokes; *b*, gooseberries; *c*, raspberries; *d*, red, white, and black currants in rows; *e*, strawberries, seakale, rhubarb, and globe artichokes; *f*, a row of plum-trees, asparagus, horseradish, and more strawberries; *g*, pot-herbs, potatoes, and peas; *h*, a row of pyramid apple-trees, parsnips, carrots, and turnips; *i*, cabbages, celery, broad beans, scarlet runners; *k*, pyramid pear-trees, scarlet runners, broad beans, cauliflower, and early brocoli. On the south border, plums and cherries.



170. In all theoretical gardening it is forbidden to crop the border on which wall-fruit is planted; but this is rare in practice: the crops indicated below generally occupy such borders; but probably a line might be drawn beyond which such crops should not approach the wall. Supposing such a border to be sixteen feet, twelve feet might be devoted to such crops in the kitchen-garden as require a warm, sunny border.

171. A walk, six feet wide, separates the quarters from the west border, on which lettuces, radishes, early potatoes, early peas and beans, kidney-beans, early strawberries, and early horse-carrots, are to be cultivated.

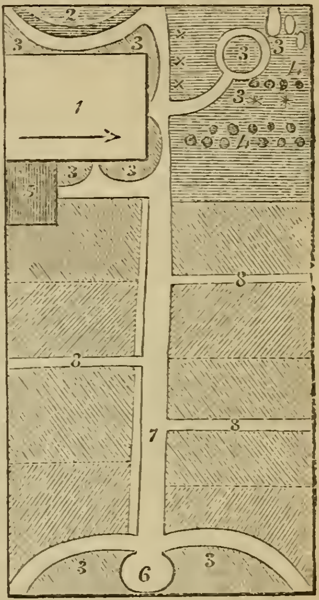
172. Where it can be so arranged, the garden should be an oblong square: 100 yards from east to west, and 30 yards from north to south, is a very convenient form, and about the proportions laid down in the accompanying plan. This allows the vegetables to range from north to south, which is always to be preferred, otherwise they get drawn to one side by the side-light of the sun.—1, The site of the house; 2, the conservatory; 3, a clump of trees and shrubs fronting the main entrance; 4, coach-house and stables; 5, tool-house; 6, manure and frame yard; 7, flower-borders and shrubberies; 8, ferns and American plants; 9, rose clumps; 10, circular beds for hollyhocks, dahlias, and other free-blooming plants in summer, and thinly planted with evergreens to take off the nakedness in winter; 11, arbour; 12, flower-beds; 13, lawn; 14, paths; 15, beds for placing out flowers in pots; 16, kitchen-gardens; 17, peach wall; 18, east wall for plums, cherries, and pears.



173. It is sometimes advantageous to have buildings and even groups of large trees contiguous to gardens; where these are situated to the north, they not only break and turn aside the cold winds, but concentrate the heat of the sun, a great advantage when early crops are required. They also preserve the crops during winter. Buildings have this advantage over trees, that they afford the shelter without robbing the soil of the food necessary for its legitimate crop. In the accompanying plan it will be observed that the whole frontage north of the house is laid out as lawn, and to the south, that the breadth of the house and offices is disposed in the same way; a single winding path running through it. East of the house lie the conservatory and offices, sheltered by a belt of shrubbery which runs round the whole lawn. The kitchen-gardens occupy the north-west side of the ground, and adjoining, at the southern extremity, are vineries, forcing-houses, and orchard-houses. The northern boundary is a dwarf wall with green iron railings.

174. A very similar plan to the preceding one, designed also by Mr. Chitty, covers an area of half an acre. Here less space is devoted to the front lawn, and probably the kitchen-garden is smaller than it might be.

175. Cottage gardens and allotments vary in size and shape, according to circumstances; some are square, some oblong, while others are angular in form, ranging in size from half a rod to a quarter of an acre. Taking a medium course, let us describe one of about thirty yards each way. Here, as in other cases, economy recommends simplicity of design: intricate plans only increase the labour, without an adequate compensation. Supposing the frontage, 3, to be laid out as a flower-garden; let the walks present a curve rather than sharp angles; let the beds be circular or oval rather than pointed; and let the space for flowers be as open as possible. Nothing is more beautiful than a smooth green plat of grass, on which one or two of the smaller ornamental trees may be planted,—such trees as the silver birch, copper beech, or some sort of conifer, as pines, cypress,—some of the araucarias, now easily procurable, or a deodar: these are not so littery as freer-growing trees, and will not so soon overcrowd the place. Let the edgings be of box, if obtainable,—nothing is so handsome; otherwise thrift, white alyssum, or some of the ornamental grasses,—or ornamental tiles are both cheap and elegant. The path should be of gravel, if possible; if paved, with pebbles, or of coarse sand,—even road-sand is capital for kitchen-garden walks, so also is burnt clay. Let the main parts of the ground be devoted to kitchen crops. If drainage is necessary, ascertain where the water can be carried to. Open a trench along the whole breadth of the plat, either into the intended outlet or into a well sunk in the ground, and into this trench lead the several drains from the higher part of the ground from one end of the garden to the outlet, gradually sloping towards the lower trench. If this be left open and kept clear, it will carry off all superfluous water; but if some brushwood is laid along the bottom, it may be covered and cropped over. Brickbats or stones will do, but pipes or tiles are to be preferred. Having done this, let one main walk pass through the centre, of about five feet wide, or more if it is to be made a drying-ground. At the end of this main walk an arbour, 6, may be formed of *Clematis Vitalba*, of the white jasmine, or yellow winter-flowering jasmine: these are suitable for the purpose, being of dense growth and habit, and very cheap. On each side of the arbour flowers or herbs may be grown. On the sunny sides of the house let a vine, apricot, peach, or nectarine be planted, seeing that a proper station is prepared for them. There is a wall having a southern aspect; let it be devoted to some of these also: if not required for home use, they are salable. The main part



of the ground should be devoted to kitchen crops, following out a system of rotation cropping, and using also a little caution in the application of manures; green, unprepared, or rank-smelling dung, breeds no end of insects, which become ruinous to the crops. In preparing manures—which, however, are essential for maintaining the fertility of the soil,—let it be remembered that all animal and vegetable refuse will be useful, when properly mixed. The droppings of cattle, sheep, pigs, and all house-sewage, should be collected and saved, and mixed with rather more than the same quantity of garden soil: the application of a little quicklime will remove any offensive smell. Let the offal, dung, &c., be laid in layers, about nine inches thick, mixed with similar layers of garden soil and quicklime, remaining so till a good heap has accumulated, when it should be turned over and mixed thoroughly before dressing the ground with it. Applied in this way, it is not so likely to breed insects, and is more efficacious. The same system of grouping and rotation of crops which will be indicated in a subsequent chapter, will be applicable. The following is a list of fruit-trees and vegetables suitable for a cottage garden :—

Apples.

Early.	*Medium.*	*Late.*
White Juneating.	Hawthornden.	Blenheim Orange.
Red Juneating.	Kerry Pippin.	Fearn's Pippin.
Red Quarrenden.		Lemon Pippin.
Keswick Codlin.		Cockle Pippin.
Manks Codlin.		Ribston Pippin.
		King of Pippins.
		London Pippin.
		Scarlet Nonpareil.
		Old Nonpareil.

Pears.

Early.	*Medium.*	*Late.*
Ambrosia, or early Buerre.	Buerre Diel.	Napoleon.
Buerre Gifford.	Duchess of Orleans.	Passe Colmar.
Jargonel.	Marie Louise.	Crassane d'Hiver } Baking.
	Williams's Bon-Chrétien.	Chaptal

Plums.

Early.		*Late.*	
Goliath.	Greengage.	Purple-gage.	Coe's Golden Drop.
Victoria.	Rivers's Prolific.	Magnum Bonum	Damson.

Vines for out-doors.

Royal Muscadine.	White Sweetwater	Black Cluster.

Cherries.

Early.	*Medium.*	*Late.*
May Duke.	Bigarreau.	Duke.
Archduke.	Kentish.	
	Morello.	

Apricots.	Peaches.	Nectarines.
Moor Park.	Mignonne.	Pitmaston Orange.
	Noblesse.	Roman (for well-drained soil).
	Malta.	Scarlet.
	Royal George.	

Gooseberries.

Green.	*Red.*	*Yellow.*
Cocks's late Green.	Champagne.	Amber.
Greengage.	Warrington.	Golden Drop.
Favourite.	Lancashire Hero.	Early Yellow.

Currants.

Large Grape, red.
Grape, white.
Black Naples.

Raspberries.

Falstaff.

Strawberries.

Keen's Seedling.
Sir Harry.
Oscar.

Vegetables suitable for the Cottage Garden.

Peas—*Early*—Emperor.
Ringwood.
Tom Thumb
Bishop's Long-pod } dwarf.
Medium—Auvergne.
Blue Imperial.
Scimitar.
Late—Knight's Dwarf Marrow.
Knight's Tall Marrow.

Beans—Mazagan, early.
Sword Long-pod, main crop.

Cabbage—Enfield Market, main crop.
Early York.
East Ham.
Colewort.

Brocoli—Early Cape.
Purple Sprouting.
Walcheren, or Cauliflower.

Savoy—Brussels Sprouts.

Kale—Green Curled.
Brown, or Ragged Jack.

Lettuce—Hammersmith, for winter.
Black-seeded Brown Cos, all the year.

Carrot—Early Horn.
Intermediate.

Turnip—Early Dutch.
Late Stone.

Onion—Brown Spanish.
Silver Globe.

Spinach—Round, for summer.
Flanders, for winter.

Potatoes—Improved Ash-leaved Kidney
Kirk's Kidney.

Vegetable Marrow—Custard.

Cucumber—Southgate, for out-doors.

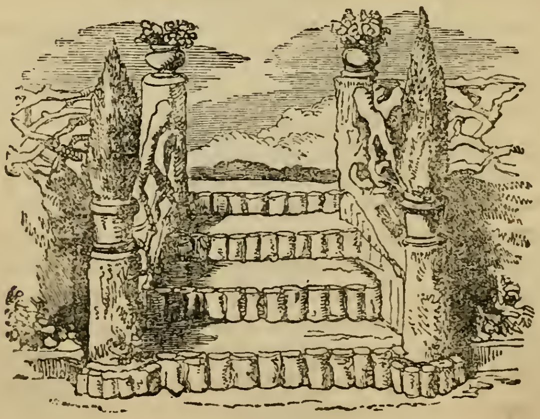
Radishes—Scarlet Short-top.
Turnip, red and white.

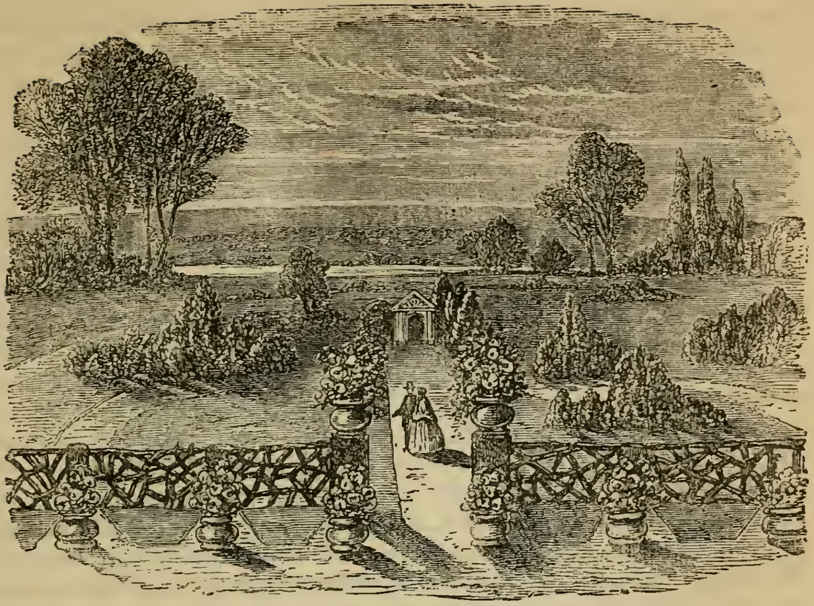
Celery—Coles's Crystal, white.
Coles's Crystal, red.

Endive—Green Curled.

Parsley—Best Curled.

Corn Salad, for winter use.





RUSTIC GARDEN-FENCE.

CHAPTER VII.

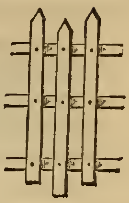
FENCES, WALLS, AND SHELTERS.

176. THE idea of inclosing land is one of the most conclusive proofs of a high state of civilization; and it is gratifying to find the *Times* noticing the fact that good fences are becoming common in Ireland, and that "gates, gate-posts, and fences, are no longer carried off bodily to boil the potato-pot;" —it is one of the best proofs of her improved condition. Indeed, the history of fencing, from the rude landmarks of ancient times up to the almost perfect fences of the present day, would, to a great extent, be the history of social progress and moral advancement. Even now, the character of districts and countries is pretty correctly photographed by the light which the nature and condition of their fences throw upon them. The social status, tastes, and pecuniary resources of individuals may often be determined in the same manner. In this, if in anything, those who judge by the outward appearance only, may generally judge pretty correctly. Fences are so obtrusively conspicuous, that they at once arrest our attention and challenge an opinion. They convey to us our first impressions of a domain, and we may thus almost determine at sight the estate of a spendthrift or a property in Chancery. Fences not only define boundaries and insure security,—breaking the force of prevailing winds, and providing the necessary shelter,—they also convey ideas of possession and seclusion, and impart a reputable or disreputable character to a property, according to the taste, or the want of it, by which

they are distinguished. The character of the fence itself, and its efficient preservation afterwards, therefore, become objects of the highest importance. In a thickly-populated country like ours, it is scarcely left optional whether estates shall be inclosed or not; but the character of the fence used is a matter of taste. Neither is there any lack of materials; for earth, water, hedges, formed of a great variety of plants,—wooden fences of every type, from the rude post, surmounted by a single rail, to the highly-finished and beautifully-designed rustic park fence; iron of every thickness and every pattern,—brick, stone, and concrete wall,—all are used. And, perhaps, each of these materials is best for special localities. A ditch, two yards wide and four feet deep, with one or two feet of water in the bottom, is a capital fence, or substitute for one, on swampy, fenny lands. A steep earth-bank, with a small ditch at bottom, containing water, may also serve all the purposes of a fence on heavy clay lands. On poor uplands, a wall of turf may answer very well, and stand for twenty years. But, however useful such expedients may be on the soils or localities indicated, they would be of no use whatever on more cultivated properties. Fences will be required for four leading purposes:—Namely, for subdivision into fields; defining the boundary, and adding dignity to the appearance of the park; protecting the clumps of trees and plantations, and maintaining a separation between the park and gardens,—or, as some writers have it, between the grass that is mown and the grass that is fed.

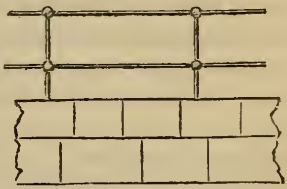
177. The boundary-fence of a park, of whatever material it is formed, should always be of sufficient height and strength to prevent the ingress or egress of cattle,—it should also be more or less ornamental. A strong fence of wood, brick, stone, or iron, from 3½ to 4½ feet high—it must be a foot and a half or two feet higher where there are deer—is well adapted for these purposes. Hedges, however excellent, can never confine deer, and are seldom efficient for cattle. The best wooden park fences I have ever seen were about five feet high, and were thus formed:—Larch trees, averaging from six to nine inches in diameter, were peeled and cut into lengths of from eight to nine feet for posts. These were placed about ten feet apart, firmly rammed, for more than a yard of their depth, into the soil, and connected together by three strong rails of Scotch fir, mortised into the post, about three inches from their front surface. Vertical splints or spars of peeled larch, formed by sawing young trees down the centre, were then nailed on, leaving clear spaces of about two inches and a half between them. The splints averaged about four inches in width, and were pointed at the top, thus Δ. No fence of wood could well look neater or stronger than this; and if the posts are partially charred for a foot above and below their junction with the soil,—that being the point where wooden posts always decay first, and, consequently, where the antiseptic property of charring would be most valuable,—and the whole coated with anti-corrosive paint, or, better still, where the colour is not objectionable, a varnish of coal-tar,—such fences will last for many years. The next best-looking and still more durable wooden park-fence would have been posts formed of oak, the rails and splints being

sawn out of the same, or out of good deal, and painted or varnished like the other. The worst wooden fences, both on the ground of appearance and economy, although they are by far the most common, are those with the vertical splints split out of oak or other timber, and nailed on the rails, as opposite.



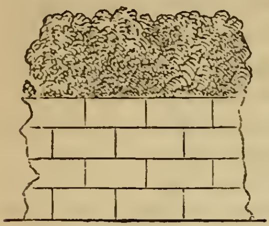
178. The edges of such splints are, of course, rough and jagged, themselves being twisted into every shape, as they can only split with the grain of the wood, and the spaces between are most irregular. An excellent fence, however, and one very commonly found in suburban residences, is a stout oak paling, placed upon a foundation of brick-work, supported by strong stakes at intervals. This is a handsome and effective fence, only inferior to a brick or stone wall for garden purposes.

179. Unless, however, for the greater shelter provided by wooden fences, and their less cost in the first instance, they cannot compete with iron, which is doubtless the best of all materials, especially for boundary fences. In point of ultimate economy, efficiency, durability, and beauty, iron stands unrivalled. Before erecting a boundary fence, I would advise every one to consult the circulars of our great wire-manufacturers. They offer the most tempting variety of designs, at astonishingly low prices; and by means of strained wire, iron hurdles, and the flexibility of the material used, the sharpest curves can be followed to a nicety, and the most irregular outline correctly traced. An iron fence for deer, six feet high, with horizontal rods, iron posts seven feet apart, and a handsome massive straining pillar for every 100 yards of fence, will be delivered at any railway station at 2*s.* 2*d.* per lineal yard. A fence of the same height, the proprietor finding the wooden posts, will be delivered at 10½*d.* per lineal yard. A heavy cattle-fence, four feet high, of a similar description, complete, can be delivered for 1*s.* 4*d.* per lineal yard, or, the proprietor supplying wooden posts, for 7½*d.* per lineal yard; a sheep-fence, three feet high, complete, with five horizontal rods, 10*d.* per lineal yard; wooden posts supplied by proprietor, 3*d.* do. do.; and so on in proportion. Nothing could be desired cheaper, and certainly nothing more efficient, than these fences. In districts where stone is plentiful and labour cheap, a wall of stone may be almost equally so; and, although less elegant, is quite as efficient for protection, and more useful for shelter. Some will prefer brick; and walls of either, four feet high, will be sufficient for bullocks and horses. For deer, the walls must be either two feet higher, or surmounted by one or two iron rails, supported by stone piers or iron posts, to give additional height, thus:—

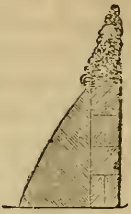


180. In situations where the extremities of parks are mostly bounded by plantations of wood, or where they are grazed by sheep only, a most useful and ornamental hedge-and-wall fence may be thus formed:—Build a wall, say two and a half feet high, and plant a hedge of holly, hawthorn, horn-

beam, beech, box, or other shrub, on a raised bank on its inner edge, as shown in the following section :—

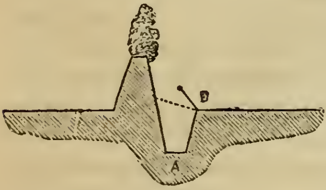


ELEVATION.



SECTION.

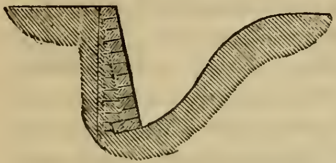
This not only presents an impassable barrier from the outside, but is one of the most beautiful combinations of a living and dead fence that can be imagined. Hedges of quickthorn alone will form excellent boundary fences for sheep, and on the best soils, with extremely good management, for cattle also. They are generally planted thus :—Sometimes a ditch is made on both sides, to give additional security, and the angle of the banks varies in different localities, and according to the soil. The plants are inserted, sometimes on the very top of the bank, at other times a foot or more down ; but the principle is always the same. It will at once be seen that the chief use of both ditch and bank is to increase the obstructive power of the hedge placed on its summit. A temporary fence of wood or iron will, however, generally be necessary to protect the hedge-plants in their young state. A single or double rail, A, standing out from the bank, B, as above, will answer the purpose perfectly well.

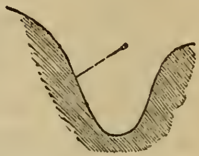


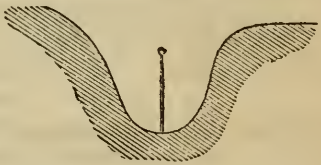
181. For temporary fencing round groups of trees, nothing, except where wood is very cheap and plentiful, can equal iron hurdles. Iron or hedges are also the best fences for permanent woods. No group in a park should be permanently fenced. Whatever the trees are of which it is formed, as they grow larger they should either be pruned to a sufficient height to protect them from cattle, or so intermixed with thorns and hollies as to form an impenetrable undergrowth of such a formidable character as to protect the other trees from the browzing of cattle. These spiny plants will also add to the picturesque effect of the groups. Trees planted on the gardenesque principle may be protected, when young, with iron guards, and as they advance in growth, their lower branches must be pruned off. This may prevent their ever becoming perfect specimens ; but such practice is better than surrounding them with permanent fencing. Trees thus treated will form pleasing contrasts to those which are allowed to sweep the turf of the pleasure-ground with their lower branches. Care must be exercised to vary the height of pruning different trees, so as to destroy the insipid sameness and tiresome uniformity of the browzing-line in parks.

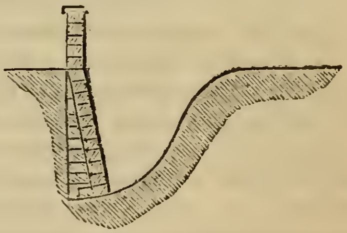
182. The fence separating the garden from the park now claims our notice. It must be strong enough to exclude all sorts of cattle, and fine enough to keep out the smallest rabbit. It must either be partially or entirely invisible, or highly ornamental, or both ; that is, it need not be of one uniform

character throughout. Where a splendid prospect challenges our admiration, it should be invisible; where a factory chimney, in a bleak locality, requires concealing, an ornamental wall may serve our purpose. Part of the fence on the plan given on page 53 is a strong iron rabbit-proof one, six feet high, which imparts better ideas of security and strength, near the carriage-entrance, than anything else, save brick or stone, could have given. The same, or a similar kind of fence, might run along most of the east side, reserving the west and south for the ha-ha. The object of the ha-ha is to make a fence entirely invisible, or to make what is a very dwarf fence from the inside, a tall one from the park. Invisible ha-ha's are thus formed, with the aid of a brick wall from four to six feet high, which should batter slightly; or the wall may be dispensed with, and a small iron fence substituted, as in the margin. Sometimes an upright fence is placed in the bottom of the ditch; but this is the worst of all forms of the ha-ha,—if, indeed, it deserves the name at all. Another form of ha-ha is to have a dwarf iron fence, with a brick or stone wall, of a plain or ornamental character, rising to the height of one, two, or three feet, as in the vignette at the end of this chapter. These walls may have a solid base, and the greater part be composed of open balustrades, finished with a massive coping, furnished with vases. The vignette will illustrate my meaning.



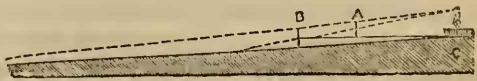


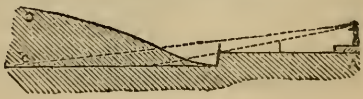




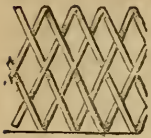
183. The following diagrams and remarks, from Repton's "Landscape Gardening," will show the importance of having these walls of the right height and at the proper distance. Mr. Repton says, where the ground falls from the house in an inclined plane, the distance of the fence can only be ascertained by actual experiment on the spot; and of course, the steeper the descent the nearer or lower must be the terrace-wall.

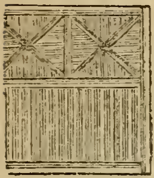
184. The eye sees the ground over the fence at A; but if carried to B, all view of the ground will be lost to a person standing on the floor-line C. If the ground be flat, as at C, in fig. 2, or rises from the house to D, the fence may be placed much farther from the house, without obstructing the view of the park from A.

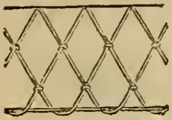




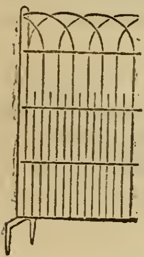
185. An invisible wire or ornamental iron fence may also be placed on the top of the ha-ha; but generally it is best finished with an ornamental wall, or left level with the inside or garden surface. At one time, rustic fences were much used for separating the park from the pleasure-ground. While they are among the most beautiful, they are certainly the most expensive of all fences. They might still be used to separate one part of the grounds from another,—the rabbit-proof garden from the outside pleasure-ground, — where labour and expense are no object. The following are among as pretty patterns as any, and they can be made of hazel, larch, spruce, or indeed any young trees. The bark should always be left on, and the more numerous and rougher the knots, the more rustic the fence will be. Wire fences, however, look better, and their patterns and prices are endlessly varied, to suit the means and tastes of all. The accompanying look as well as any.

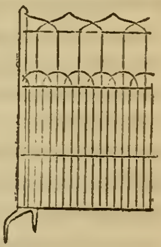




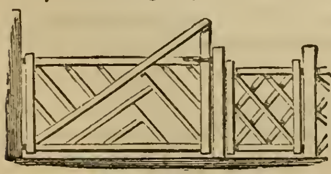


186. Walls are occasionally introduced into flower-gardens, — either for the shelter they afford in bleak localities, their architectural effect near dwelling-houses, or the culture of the more tender plants in the open air. In all such cases they should be formed of the best materials, and either panelled, or rendered otherwise ornamental. They should seldom be more than ten or less than six feet high, although those who have seen the enormous magnolia walls at White-Knights Park, near Reading, will feel inclined to double my maximum. As a rule, however, the elevations I have named will look best and be most suitable for cultural purposes. It would be worth going a hundred miles to see a wall six feet high and fifty yards long, furnished with a collection of tea-roses in full bloom. If the wall were furnished with a coping projecting four inches, and grooved underneath, to remove the drip of water, and the roses were slightly covered in winter with spruce branches, and sheltered with canvas covering from early spring frosts, such a sight might be realized, and a wall affording alike shelter and fence on one side, become an object of surpassing loveliness on the other.

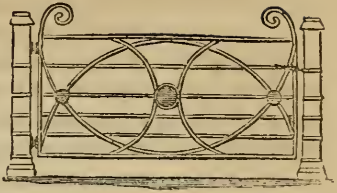




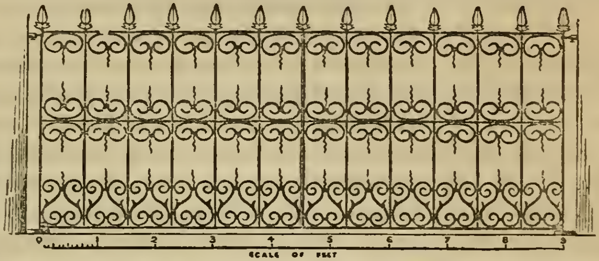
187. For single gates across a carriage-road, or anywhere else, nothing can be better than those in the sketch. The number of bars and patterns of such gates can be made to suit every purpose, and gratify every taste. On carriage-roads gates should never be less than four, and seldom need be more than



six feet high,—five being an excellent average.



188. These observations upon fencing will be incomplete without a few remarks upon gates. As a general rule, they must always be in harmony with the character of the fence. Occasionally, however, in pleasure-grounds, where a rabbit-proof fence is hidden with shrubs, the gate spanning the walk may be much better and more elegant than the fence. The most beautiful gates I have ever seen are those in the gardens at Hardwicke House. A broad gravel promenade, in front of part of the range of glass, bounded on one side by a ribbon border, and on the other by a panelled wall, furnished with vases on all the piers, is terminated at both ends by lofty iron gates of chaste pattern and blue-and-gold colour. Three smaller pair and two large gates, of similar colour and patterns, are used in different parts of the grounds with excellent effect. Lodge or entrance-gates are most effective in pairs. They should neither be too massive nor too light,—of sufficient width to prevent anxiety about wheels or posts; of elegant pattern, strong construction, and a colour that can be easily discerned at night. Nothing can equal, in ultimate economy, nor exceed in usefulness and beauty, a well-raised, carefully-hung pair of wrought-iron gates, ten or twelve feet wide, and painted a light stone-colour. D. T. F.



189. The GARDEN WALL is as the setting to the gem; without its inclosing fence, it would be undistinguishable from the neighbouring fields, and its contents exposed to the depredations of man and beast, as well as to the "pitiless pelting" of every storm. But besides the protection it affords in this sense, the properly-constructed garden wall has other important conservative duties. Dr. Wells, in his interesting experiments on the origin of dew, found that a thermometer protected by a handkerchief sustained horizontally over it, marked a temperature from four to six degrees higher than the corresponding instrument placed in the open ground. The wall and its coping exercise a conservative power in preventing the radiation of heat in the one case which the handkerchief exercises in the other.

190. The wall performs another equally important office; during the heat of the day it absorbs the sun's rays in a ratio proportioned to its aspect and inclination to the sun; and, in common with all heated bodies, it radiates its heat in a ratio proportioned to the square of its distance; so that if an object

placed a foot from the wall receives 1° of heat from it, at one inch it will receive heat equal to 144°. The reflection, also, of all unabsorbed rays impinging on the surface of the wall, greatly increases the temperature of the air in immediate contact with it. Besides this power of absorbing heat, moisture is also absorbed, both from rain and from the atmosphere, and, with the heat, is given out by radiation, tempering the atmosphere during the night: a wall is thus, in every sense, a source of protection; and it is of considerable importance that its height and form, as well as its workmanship and materials, should be well considered.

191. The countries of southern Europe, and especially Italy, can dispense with some of the conservative properties of the wall, and render architecturally ornamental that which we must make strictly utilitarian. The walls of Italian gardens are, therefore, frequently decorated with alcoves and balustrades, with a full complement of statuary and vases.

192. It has been already mentioned that the ha-ha fence, invented by Kent, has been considered the best form of external fence; it affords protection from without, and it does not obstruct the view, but carries the eye uninterruptedly into the neighbouring domain, while a light wire fence offers the best possible protection from game and other *feræ naturæ.* A holly or privet hedge may with advantage surmount it on the east and west, especially if it is intended to have outside borders, either for wall-trees or vegetables: where circumstances permit, a belt of trees on the north or north-east side of the ha-ha will also afford a desirable shelter.

193. Within this external fence the kitchen and fruit gardens usually form a separate inclosure, more or less extensive, according to the means of the proprietor; and the wall surrounding this inclosure we have now to consider. Garden walls have long been a subject for discussion, and will probably always remain so: like everything else connected with gardening, they depend on local circumstances of climate, elevation, extent, and undulation. The walls which would be suitable for a moderate-sized kitchen-garden, in a flat or thickly-wooded country, would be very unsuitable for a loftier site, on the side of a hill, or in an open undulating country; while a plot of small extent, inclosed by walls fourteen or sixteen feet high, would be inadmissible both on artistic and physiological principles: on the first, it would seem as the walls of a prison; on the second, it would literally be so, excluding the air, which is essential to the growth of plants.

194. On these grounds, the best practitioners consider that, for small gardens, 8-feet walls are most suitable, provided the trees on them are planted so far apart as to admit of their horizontal extension. For gardens of larger size, 10-feet walls, and for an extensive garden 12, and even 14 feet, will not be too great. Nicol thinks 10 or 12 feet a height convenient for pruning, watering, and gathering the fruit, giving also ample space for the expansion of the branches of most trees; but he adds, this should be influenced by the extent, or apparent extent, of the ground, the latter depending upon its cast: if it is a lengthened parallelogram, for instance, the ground will seem larger

than it really is; if an exact square, it will seem smaller. So, if it is flat, it will seem smaller than if it is either undulating or sloping; while, on an elevation, loftier walls will admit a larger amount of atmospheric air than if it is placed in a hollow, or even in a flat country. Where an acre of ground, in the form of a parallelogram is inclosed, on a gentle elevation, he recommends a north wall 14 feet high, and the east, west, and south walls only 10 feet: if the slope of the ground is considerable, the difference may be less. In gardens of greater extent—inclosures of four acres for instance, the walls may be higher, but in no instances more than 18 feet high for the north wall, 15 feet for the east and west walls, and 12 feet for the south wall.

195. In a parallelogram of 400 feet by 300, which is about two acres, and a well-proportioned piece of ground if the lie of the land is an easy slope, Mr. McIntosh recommends a wall 16 feet high for the north wall, 14 feet for the east and west walls, and 12 feet for the south wall; but on level ground, while the north wall is still 16 feet, he would make the east and west walls 13 feet, and the south wall 10 feet. Rogers considers low walls much more convenient in management, more easily protected; and, seeing that the fruit-trees are most productive under horizontal training, he recommends two walls of 6 feet high, with the trees planted at good distances from each other, and asserts that such walls will produce more fruit in any given number of years than one 12-feet wall. "Low walls give free ventilation," he adds, "which is necessary at all times: even high winds do less damage than foul stagnant air, pent up within four high walls." Mr. P. Walker thinks walls should not be under 8 feet from the ground-level to the coping, but 10 feet he considers the most useful height for general purposes; but where the garden area is flat, the appearance would be improved by raising the north wall a foot or two higher, carrying the rise round the north-east and north-west angles, and finishing with an appropriate canatto, or turret.

196. The materials of which walls are formed will always depend upon local circumstances; brick, stone, clay, chalk, and oak fencing, being all in common use for the purpose. Of all these materials, brick seems to be the favourite, being most convenient, absorbing most heat, and being most enduring. Forsyth says, "Where brick cannot be had, it is better to dispense with walls altogether, and adopt wood." Brick walls are, therefore, considered the best for all practical purposes; they are most convenient for training, and they absorb and retain most heat. Whinstone, a species of basalt rock common in the northern counties, is next reckoned for these qualities, while its close grain rejects moisture.

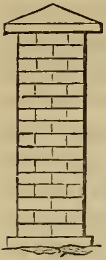
197. It has also been a question whether inclined or vertical walls were most favourable to the produce of wall-fruit. Zigzag walls, and walls with deep recesses, have also been experimented on; and, latterly, glass walls, which, after all, only amount to an arcade inclosed with glass and lined with vines, fruit-trees, and exotics,—very charming, no doubt, if they do not cost more than they are worth, even as a costly luxury.

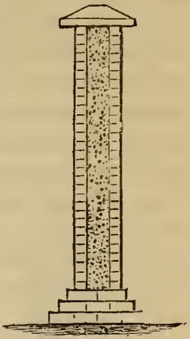
198. In reference to the really practical question of walls, the Caledonian Horticultural Society instituted, some years ago, a very interesting series of experiments on the comparative merits of a wall coloured black, an inclined wall at an angle of 50°, and a vertical wall of the same freestone. The results were very varied. At 6 p.m. in April, the average temperature of the sloping, the black, and the freestone wall was the same,—the brick wall was one degree lower. During May the temperature of the brick wall was considerably higher. At one o'clock in the day the average temperature of the sloping wall was seven degrees higher than the brick wall,—the whinstone wall was three degrees, and the free stone five degrees, lower than the sloping wall; and at six o'clock the sloping wall was two degrees higher than the freestone and brick wall, and five degrees above the whinstone; but in frosty weather the sloping wall was three degrees colder, in the night, than any of the others. It may therefore be assumed that, for all practical purposes, the brick and whinstone walls are nearly equal, and only a shade in advance of the freestone wall.

199. The position of the walls being determined, as well as the material, the foundations should be excavated. Their depth must depend upon the subsoil, and the workmen should dig until they reach a solid homogeneous bed. The trench completed, it should be filled up, to within six inches of the surface, with concrete, consisting of six or seven parts of coarse gravel, stones, or brick rubbish, to one part of freshly-slaked lime, reduced to a thin paste, which may be thrown over a thin layer of the gravel; but the better foundation is formed by mixing the material thoroughly in a heap, and turning it out of the wheelbarrow into the trench, from a raised bank, raking each layer level as it is thrown in.

200. The thickness of the wall must depend on its height, and the foundation should be thicker by three or four inches than the wall itself—this thickness rising five or six inches above the surface-level. For a wall six or seven feet high, a single brick, or 9-inch wall, will suffice; for higher walls, it will require a brick in length and another in breadth, or 14 inches; beyond 12 feet and up to 18, two bricks in length, or 18 inches. Walls of these proportions are capable of supporting a lean-to green-house of corresponding height, if they are properly bonded, and hot lime or good cement is used. There is this practical difficulty in the more weak wall, that the bricks shrink unequally in drying. This inequality might be remedied by using the shorter ones as "stretchers," as bricks laid longitudinally on the wall are called, using the regular-sized bricks for "headers." But the bonding or tying, which is the object of laying headers and stretchers, would not be attained. It is, therefore, to be provided for by using half-bricks, and throwing out the short ones. The brick in length and breadth, and that in two lengths, are more easily laid and bonded; but the chief aim of the gardener, if he is charged with the superintendence of the work, is to see that the workmen use the proper bricks, and that they are bedded in a moderate quantity of mortar made of fresh-slaked lime or cement.

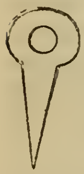
201. An economical wall is sometimes constructed of a brick in bed, or stretcher, on each side, the space between being filled up with concrete similar to that prepared for the foundation. This adheres to the brick-work ; headers, or bricks across, being used occasionally as bonders, to hold the two sides together. A solid wall of 14 inches, or even 18, which would require 3,620 bricks to the rod, would thus only require 1,210, while the cost of the concrete is comparatively trifling. In countries where brick is not easily come by, a very good wall may be constructed with a brick in front and stone behind, where one front only is required for use.

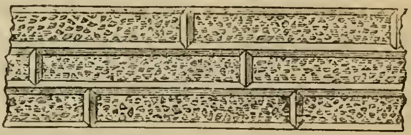




202. The introduction of hollow bricks is supposed to be conducive to dryness and free ventilation, while it greatly reduces the pressure on the foundation ; but it does not appear that we have any great experience as to its result on garden walls.

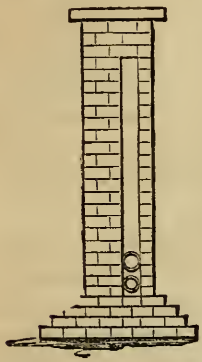
203. Stone walls for gardens should be built in courses of four or eight inches thick ; the stones ashlar or hammer-dressed, the joints chisel-dressed, the mortar-bed not too thick, and the joints pointed and drawn clean. In stone walls—perhaps in brick walls also—copper or iron nails with eyes should be let into the interstices of the wall, to tie down the branches of the fruit-trees, taking care that they are let in with the eye close to the wall ; for the radiation of heat from the wall is in proportion to its distance, and the heat which is one degree a foot off the wall, is, as we have seen, a hundred and forty-four when in contact with it. The advantage of the eyed nails consists in preserving the wall. Thread dipped in pyroligneous acid, or flexible wire, may be used for the purpose. The shred-and-patch mode of training the young shoots will surely never again be used upon a new wall.

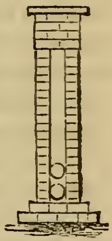




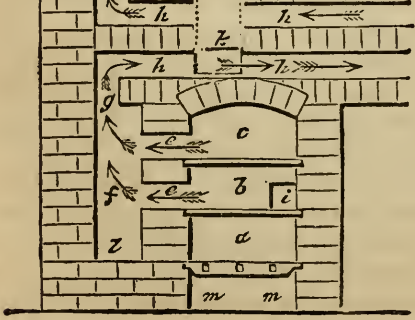
204. Hollow walls are only found in gardens of lofty pretensions, where very high cultivation is adopted ; and we have reason to believe that in many quarters where they exist, they are rarely used. Mr. Henry Bailey, Mr. Harcourt's gardener at Nuneham, supplies us with very good reasons for their use, however ; and certainly, where expense is no object, every gentleman would like to see his walls covered with fruit in its season. "Apricots," says Mr. Bailey, "when placed on a south wall, are soon excited by open sunny days in spring : the sap-vessels become filled with watery sap. In this state, if a severe frost occurs, the sap-vessels are burst by the freezing fluid, and the whole economy of the plant deranged. Some parts of the tree

suffer more than others. The branches most affected having consumed the sap inherent in them, can draw no further supply, and on the first day when the solar influence is sufficient to cause perspiration, they languish and die. The cause of the injury is not always apparent at the time; but in a ratio proportionate to its extent, it will show itself in a year or two." In this manner Mr. Bailey accounts for the paralysis which so frequently overtakes this highly esteemed fruit—first a branch, then a whole side dying away, in the fine sunny days of spring, to the surprise of the gardener; the Moorpark variety being especially subject to such sudden mortality.





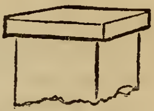
205. The walls Mr. M'Intosh has erected at Dalkeith Palace are twelve feet high and eighteen inches thick. A rubble-stone concrete foundation rises to within six inches of the surface, over which are laid nine courses of brick in bed on the wall side. The tenth course on each side has headers laid across, meeting in the middle every three feet, as binders to the wall, having a whole brick laid over them. The bottom of the vacant space is occupied by the water-pipes. The same is carried on upwards, only changing the place of the headers, so that they shall not be immediately above each other; the last three courses being solid. This wall gives equal heat on both sides, and in place of headers hoop iron may be employed as binders. When one side only is to be heated, a brick and a half, or fourteen inches, will occupy one side, and brick in bed the other.

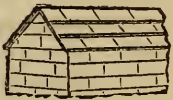


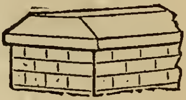
206. Mr. Walker recommends a mode of heating by hot air, the apparatus being a furnace, placed below the ground-level of the wall, and as much as practicable at the lowest point. The furnace is bricked in, so that the coal may coke, both for economy of fuel and labour. The air in contact with the plates *b c*, being expanded by heat, will flow into the hot-air chamber *f*, coming in contact with the colder air there. Here it acquires a rotatory motion, retaining a tendency to ascend in the ratio of its rarefaction, flowing along the flues *h*, in the direction of the arrows, into the flues *h h*, through the narrow opening left. The sliding of the doors *i* will acce-

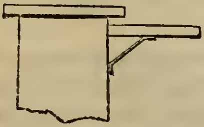
lerate its circulation. This system obviates the necessity of cleaning the flues, which is found difficult in practice; while hot water, which is advocated in some places, is found too expensive for ordinary use.

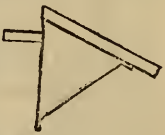
207. Coping to garden walls has been a "much-vexed" question, and probably many practical men retain their own system, without paying much attention to theories; for, in gardening, a common-sense application of the means at hand, and taking everything at the right time, is of more importance than the best-formed theory imperfectly carried out. It seems very well settled, however, that a stone coping, projecting an inch or two over the wall on each side, is necessary for the protection of the wall from the effects of rain, and to that extent that the coping is useful in retarding the radiation of heat. Mr. Walker recommends a coping, as improving the appearance, and necessary for protection from the weather; and he adds, that a coping of slate flags, two inches thick, bevilled off to three-fourths of an inch at the edges on each side, which he saw in the gardens of Mr. Walker, of Preskelly, Pembrokeshire, is one of the simplest and most efficient he had seen. "These projections," he says, "greatly enhance the conservative power of the walls." He proceeds to condemn the practice of fitting wire or wood trellis on the face of the wall, as interfering with this conservative power. "A space intervenes betwixt the trees and the wall, where the heated air escapes at the small angle of divergence, in consequence of the greater lightness of the air, caused by rarefaction, while the constant flowing of the denser and colder current to supply its place produces a current which destroys the forcing power of the wall." He arrives at the conclusion that the only eligible mode of training trees on an open wall is by nails and shreds. We think the nails and eyes, the latter being close to the wall, might be made to meet all his requirements, leaving the wall sound and clean.







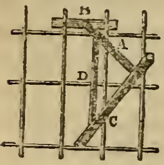


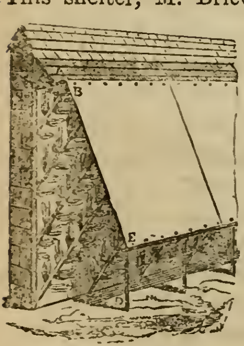


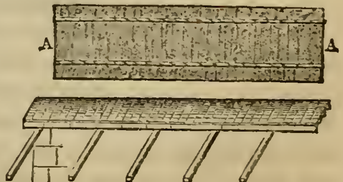
208. Admitting that the coping projecting two inches is necessary for the protection of the wall, and beneficial to the tree, the best horticulturists come to the conclusion that temporary copings, extending eighteen inches beyond the wall, with protecting curtains depending from them, are very useful during the spring months; and Mr. Errington considers that by using them in autumn a fortnight is added to the summer, and time given for the ripening of the young wood. He recommends a temporary coping, seven or eight inches, in the summer and autumn, and twice that in April and May. Mr. M'Intosh considers wet walls in summer as robbers of heat, and that a wall with a good projecting coping, capable of being moved in the heat of the day, is invaluable after sunset. The portable coping at Dalkeith

is a boarding nine inches wide, supported on iron brackets, to which the boards are attached by screws. In the Horticultural Society's Gardens the copings are more inclined, the stone coping projecting two inches; and six inches thick of York paving, Caithness flag, Ackworth paving-stone, and various heads of slate of the Pembrokeshire and other Welsh counties, make excellent coping stone. Roman cement has been tried; asphalt has also been tried successfully. Glass, six inches thick, and bevilled, has been thought the best material for coping, being perfectly indestructible by the weather; and cast iron has been found to answer. As to shape, the flat coping, with a groove to carry off the water, is supposed to be excellent. A very good coping is sometimes formed of brick and cement, as on the other side. Another form of coping strongly recommended is a stone, sloping on each side, laid on a flat one placed horizontally over the wall.

209. Copings projecting too far are said to deprive the leaves of the vigour they derive from summer rains and heavy dews, although they are useful in spring, when the trees are in blossom, and up to the time when the fruit is set. At this season, even in the drier climate of France, it is found necessary to protect the tender blossoms from the late frosts, hail, snow, and cold rains of spring, which are very fatal to stone-fruit; the walls in France being generally trellised, in order to protect the trees from the intensity of the heat produced by radiation, as distinguished from our own more moist climate, where the practice is reversed: an angular framework of wood is attached to the trellis, projecting some twenty inches or so from the wall, at an inclination of 50°. When the tree begins to vegetate, towards the second week of February, hurdles of straw attached to rods of wood, 7 feet 4 in. in length by 2 feet broad (fig. A A), are placed on the triangular frame, so as to shelter the tree at the time when it is in blossom, till it has begun to stone, resting on the trellis A D C. When the trellis is absent, projecting rods of wood are attached under the coping, upon which the hurdles are laid in lengths, at a similar angle. This shelter, M. Brieul assures us, is indispensable for stone-fruit. Apples and pears are also benefitted by the shelter, especially when exposed to a north or west aspect, or in damp localities. This protection, however, according to the same authority, which suffices while the temperature stands at 1° or $1\frac{1}{2}$° below zero, becomes useless when it descends to 3°, or even 2°, which too frequently sweeps away the hopes of the fruit-gardener. The walls should then be protected by



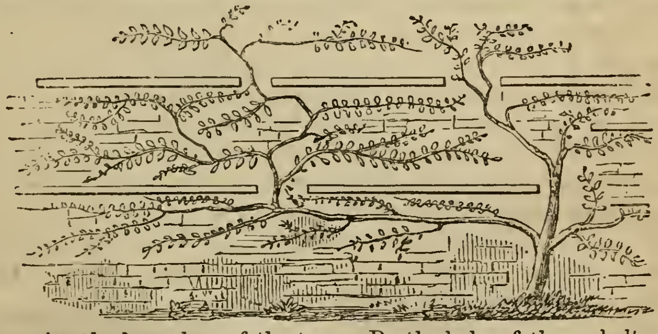




means of a rough canvas, such as is used by paperhangers to cover walls before papering, which is attached to the projecting hurdles under the coping, at B, and at foot to posts driven into the ground at an angle of 50°. This canvas covering permits the light and air and warmth to pass; the vegetation is uninterrupted, but the protection is sufficient to exclude the strongest spring frosts.

210. Mr. Gorrie, a well-known and experienced horticulturist, found that the projecting coping added greatly to the warmth of the walls, the difference being from 4° to 11°; and it will be readily conceded that this advantage is a very important one. At the same time the cost of permanent coping adds greatly to the cost of the wall. Mr. Gorrie proposed to train the Ayrshire rose on a projecting trellis under the coping, so as to give shelter to the fruit-trees while in blossom, the rapid spring growth of this rose being favourable for the purpose, while its deciduous habit admits of the full play of the wind in winter.

211. The Rev. John Lawrence, one of our oldest and best writers on fruit-trees, among the causes of barrenness to which he directs attention are—cold seasons, but especially *frosts* and *blasts* in the spring. Having recourse to mats, although sometimes successful, has many objections, which put him to considering some more efficient remedy,* and it occurred to him that horizontal shelters presented the one needful remedy. He experimented with thin bits of board or tile, fastened to the wall, and found them to succeed to a marvel, securing fruit wherever they were placed. For this purpose he proposes to lay rows of tiles in the wall at distances regulated by the space between the lateral branches of the tree, and jutting forward from the plane of the wall about an inch and a half, not in continuous rows, but with gaps to receive the branches of the tree. By the help of these shelters, says Mr. Lawrence, "even in the most difficult year, a good quantity of fruit may *almost* be depended upon from such blossoms as are sheltered by the tiles. The fruit thus sheltered from perpendicular cold and blasts I have experienced to be much larger, better, and finer-tasted, than those of the same tree where exposed. They are also forwarder and earlier ripe than the others."



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* "The Pleasures and Profits of a Garden." By the Rev. John Lawrence. A revised and corrected edition, by the Editor. Bell & Daldy.

212. Besides brick and stone, chalk and clay have been sometimes employed in erecting garden walls with success. In each instance the process is pretty nearly the same. A foundation being obtained, a wooden frame is prepared and laid down on each side, of the exact thickness of the intended walls. Into this frame chalk or clay, previously worked into a thick paste, is thrown in layers about six inches thick all round. The layer thus placed is made level by raking, and left to consolidate, which it will do at one end before the workman has reached the other end of the wall, if it is of any extent. In this way the work proceeds layer by layer, until the intended height is attained, when a coping of stone or other material is bedded on it with cement or mortar.

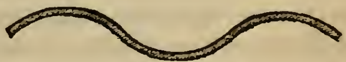
213. It will be readily enough understood that this sort of wall is only resorted to where bricks and stone are nearly inaccessible, and then it is only an indifferent substitute. Nails with eyes, or wooden slips, should be inserted into such walls, to tie down the branches to; for the shred-and-nail system here would rapidly destroy them. Plates of wood will also be necessary to bind them together; and probably oak posts, at intervals not too great, will be necessary to their support. For the gate-posts, of course, either stone or wood will be requisite. We have heard of an entire house with garden walls being erected on this principle, in chalk, but have never heard with what success. It is, however, an interesting question, as the cost of such a house, where the subsoil is chalk, is confined to the labour—and labour of the most ordinary kind,—the soil dug out yielding all the material.

214. While treating of walls and laying out gardens, let us give the reader an excellent piece of advice from quaint old John Lawrence:—"To those who are to form a garden anew, I say that thirty or forty yards square is abundantly enough for that you intend for your best garden, where you would have your choicest fruit to grow. More would only make you uneasy, to keep and manage it as you ought." Returning again to this argument, he gives in detail the produce under his own management of forty yards square. On his north wall, or south aspect, he has seven peaches trained with his horizontal shelters. Of these he reckons each tree under proper management will produce a hundred of large fair fruit; "but, lest that number may be thought too large, let us take half, and say fifty; the seven peaches on the best wall, will thus produce, at a very moderate computation, three hundred and fifty." On the same wall he allows three of the "large Turkish apricot, which hath a noble flavour," and on another wall five. "If they be managed as they ought, and at full growth, I cannot say that I remember a year when they have afforded me less than a bushel of fruit." On his best wall he allows room for four or five of the best French pears, which are so little inferior to stone fruit, and yet come to their maturity when the other is gone. With good management each tree will yield half a bushel. "On the east, west, and south wall I allow room for some of the best plums." Upon the whole, here is a square wall, forty yards square, which will afford room for forty trees suited to its several aspects, which, with the dwarf pears, plums, and cherries, which

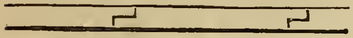
occupy the centre of the square, which, he reckons, yield, on estimate, fourteen bushels of finest pears, and an "abundant provision for the table, throughout the season, of cherries and plums;" while vines, figs, and winter pears are not forgotten, each sort suitably placed to the sun, which, with good management, may reasonably afford every year a sufficient variety as well as quantity of the best fruits." Such is the opinion of the Rev. John Lawrence, based on the result of his own skilful management.

215. The following remarks of our experienced contributor Mr. D. T. Fish will be found of great interest; exemplifying, as they do, his own practice:—The introduction of orchard-houses has, or ought to have, revolutionized the whole practice of the culture of tender fruit in the open air. Except in the most highly-favoured localities, I would not advise furnishing walls with peaches and nectarines, unless provision were made for covering them with glass in early spring and in late wet autumns. The safety of the blossom and embryo fruit, and maturation of the wood, would thus be insured. It would be wiser, however, to devote the best walls to the culture of pears and plums, and to erect orchard-houses for all other stone fruit, and the tenderer varieties and choicer sorts of plums. I think the latter cheaper, more efficient, and certain than glass walls. As the erection, furnishing, and culture of these houses will be intrusted to other hands, I wish to give my emphatic opinion here in favour of planting the trees out rather than growing them in pots. Success is probable and possible enough by pot-culture; with ordinary care it is certain, if the trees are planted out in good loam.

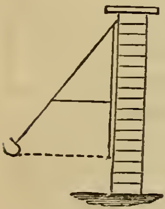
216. But we have been so long accustomed to grow peaches and nectarines on walls, that many will still insist upon doing so; and therefore the best descriptions of walls, most approved methods of protection, &c., continue to be subjects of the first importance. No material for kitchen-garden walls can equal good red brick of medium hardness of texture. The joints should be formed as narrow as possible, of the best lime and sharp sand, and can either be left white, or the lime can be coloured a few shades lighter than the bricks. The bricks are better without any colouring whatever. This is not only the best-looking wall, but the plants are easier trained to it, and are probably subject to fewer alterations of temperature upon its surface than they would be upon a wall of any other substance or colour. Walls should never be less than 8 or more than 14 feet high, and may vary from 9 to 22 inches in thickness. From 10 to 12 feet is a good average height, and 14 inches in thickness will impart strength enough for that height. Sometimes walls 6 feet high are built only 4½ inches thick, and in this form to impart strength. A 4½-inch curved wall of this form will resist as much pressure as a straight wall 9 inches thick without piers. As a rule, however, all kitchen garden-walls should be straight; and they are not safe without piers, unless formed of brick-and-a-half, or 14 inches thick. All walls for fruit-trees should also be furnished with a coping



of stone, slate, or some other hard, durable material, of sufficient width to project four inches on each side of the wall. The top of the coping should be slightly convex, and the under surface as much concave, to facilitate the removal of water. A groove should also be formed ½ an inch deep, and ¾ from the outside edge of the lower side, to intercept and throw off all drip. The coping should also be made in as long lengths as possible, to reduce the number of joinings. If stone is used, the joints should be formed of the best Portland cement; if slate, a mixture of white and red lead must be used.

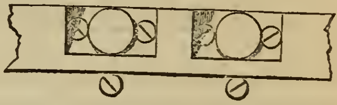


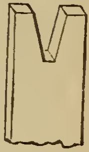
It would also be advisable to have the copings overlap, as they are comparatively useless unless waterproof. As in fine weather, frost falls in nearly perpendicular or vertical lines, a coping projecting over a wall will often protect the trees on its surface; and it will do this the more effectually if it has previously preserved them in a dry state. However, permanent and temporary copings of much greater widths are

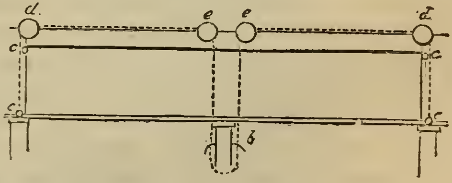


frequently used. The accompanying section represents a bracket for supporting a slate coping in use on two walls here. The top surface of the bracket consists of a bar of iron two inches wide, on which the slate slabs meet. Our slabs average 3 feet 10 inches in length; but of course any length may be used: the longer and stronger the slabs, the fewer the brackets required, and *vice versâ*. An iron water-trough runs along in front, to convey the water into a drain at the end. A great drawback to such copings is, that the trees are deprived of the natural rains and dews. This, however, may be remedied, to some extent, by syringing. Such brackets would be invaluable for applying temporary copings of wood for a few weeks in spring and autumn. Notwithstanding all that has been written against the practice, I am still in favour of affording protection to the surface of wall-trees when in blossom. No copings, wide or narrow, permanent or temporary, will shelter them from cutting frosts driven in upon them at that time by a sharp wind. No writer who condemns covering can be more alive to the great importance of thinning both wood and fruit, getting the former thoroughly matured, and preserving the tree in the most robust health; but I really cannot see that this precludes us from protecting the blossoms in the spring. Good summer culture will doubtless secure a good show of fruit, and endow the tree with sufficient strength to bring it to maturity; but it never has, and never can, enable the tender blossoms of peaches and apricots to withstand a frost of 2° without protection. The system adopted here is, I believe, the same as that in use in the Royal Gardens at Frogmore; its great merit consists in the facility with which it can be removed and applied at pleasure; for I would rather not protect at all than apply a permanent covering of any description. The artificial tenderness and extra liability to the attraction of insects in consequence, would be more disastrous than the frost itself. No valid objection can, however, be urged against temporary protection, applied only in cases of absolute necessity, and at no other time. So particular am I upon this point, that I have let the blinds down even at midnight when the weather has been uncertain.

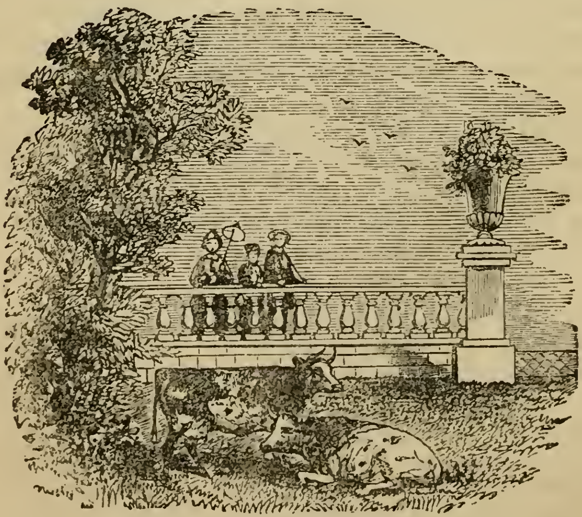
217. I will now describe the system adopted.—About 1 inch below the coping a splint of wood, 2½ inches wide and 1½ inch thick, is firmly secured to the wall. This splint is furnished with hooks about 1 inch long, and 1 foot apart. Pairs of pulleys, 1½ inch in diameter and ¼ inch deep, are fixed on this splint, at intervals of 8 feet apart, all round the wall. They are let into the splint in a bevilled direction, by cutting off part of the top and front surface; and each is firmly kept in its place by four screws, as in the margin. Small eyes are also placed below every other pair of pulleys thereon, at distances of 16 feet apart. In the ground, about 4 feet 6 inches from the wall, and 16 feet apart, two posts, 4 inches square, are firmly inserted, leaving about 3 inches above the surface. These posts are 2 feet 6 inches apart, and connected together with a strong piece of wood, 1½ inch wide and 3 deep, nailed on the inner or wall side of the posts. Another single post is placed in the centre of the space between the pairs, leaving a clear space of 8 feet between. The tops of the posts are cut out in the middle, as here shown, and the single one is furnished with a double hook for attaching a cord round. Splints of wood, ½ inch square and 10 feet 6 inches long, are then attached to the hooks already referred to, by an iron eye attached to the upper end, the bottom end resting in the opening of the centre of the post. A canvas screen, 2 feet wide, attached to two similar splints of wood, is then hooked on to the top of the wall, resting on the pair of posts already adverted to. Wooden rollers, 16 feet long and 3¼ inches in diameter, furnished with a cast-iron wheel at both ends, 4½ inches in diameter, 1½ deep, and 1½ wide across the mouth, for the reception of cord. The other end of the canvas has pieces of zinc an inch square, with a hole in the centre, firmly sewn to it, a foot apart. These are for attaching to the hooks on the splint at the top of the wall, and the cord is then run through the hook *b*, over the end of the roller *c*, round the pulley at *d*, along the top to *e*, through the pulley at *e*, and drawn down on the outside of the canvas at *f*. It will be seen that each roller is furnished with four pulleys and two cords, and it can be moved up and down with the greatest despatch. The canvas screens fixed on the pairs of posts, while they support the end of the rollers, also allow plenty of space to work in, without coming in contact with each other, and without leaving a vacancy between. Angular screens are also provided for, filling the spaces at the ends, so that it forms a complete canvas house when the blinds are down, and it can be removed or applied in one half

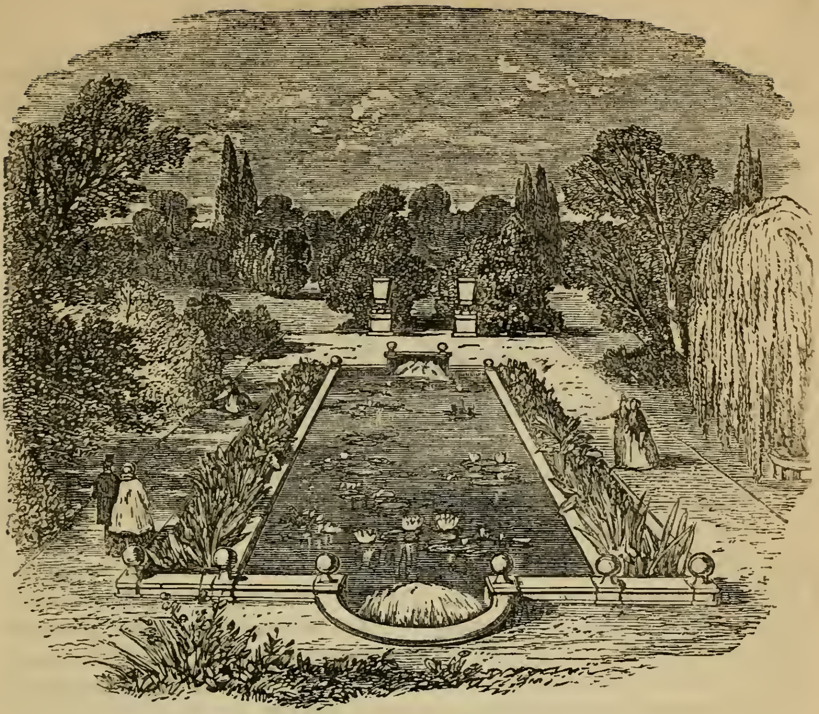






the time I have taken to describe it. Such blinds carefully used will last a dozen of years, and often save a crop in a single night; and they are equally useful in autumn in maturing the wood, as in spring for protecting the blossoms. In cold districts they would be equally useful for pears, plums, &c. Flued walls, carefully managed, may often insure a crop, also; but great care is necessary to prevent an excess of heat: combined with canvas covering, less heat would be necessary. Provision should be made for easily and expeditiously cleaning them, as a flued wall on fire is certain death to the trees. Hot water would, of course, be infinitely better, attended with no danger, and certain benefit. Its first expense, however, is great, although its working would be cheap; for, no aperture being required, a very gentle heat would suffice. Both for flues and hot water, of course the walls would be partly hollow; and, apart from heating altogether, some recommend hollow walls. There can be no possible objection to their use: they would possibly be drier at all times, and certainly the air contained in their interstices, being dry, would retain its heat for a considerable time, and raise the temperature of the wall when the heat might be most wanted. The grand secret of successful fruit-culture on the open walls, however, is to have the wood well ripened in the autumn, retarding it from blooming early in the spring, by removing it from the wall. Finally, trees should always be attached to the wall, and not tied to nails, &c., however close they may be fixed to it. Nailing is not only more expeditious, but better for the trees than tying. Such is my decided opinion, notwithstanding all the hubbub about nail-holes, to the contrary.—D.T.F.





GEOMETRICAL FLOWER-TANK.

CHAPTER VIII.

FOUNTAINS, FISHPONDS, & ORNAMENTAL WATERS.

218. "FOUNTAINS and Sculpture," says Sir Uvedale Price, "are among the most refined of all garden ornaments." When judiciously combined, the effect is most brilliant. It has been objected that fountains are not natural objects; but we have already seen that the garden is altogether a thing of art—

> "That which increases every charm reveal'd
> Is that the art which wrought it lies conceal'd."

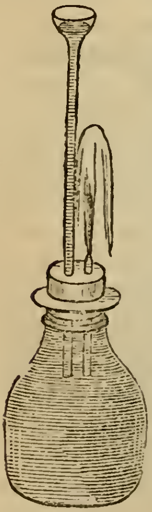
And the fountain differs in no respect from other garden accessaries. But it is only in the long days of summer that fountains add a charm to the scene in our variable climate. It is not, therefore, very surprising that the efforts to establish fountains have not been fortunate either in our gardens or public places. Besides, they are very costly luxuries. A day of the water-works at Versailles, when in full operation, involves a cost of some hundreds of pounds; and the water to supply the fountains at the Crystal Palace is pumped up by steam-power to the summit of the two lofty towers, whence it descends, producing for a short time a very magnificent display. But it will be easily understood that this is produced at a very considerable cost, and could not be continued for any lengthened period. In no case, therefore, except in the midst of mountain scenery, where water is retained by some peculiarity of the soil, or by artificial embankments, can fountains and *jets d'eau* be brought into frequent use, and in the midst of these wild scenes, the natural cascade supersedes all thoughts of the artificial one. The *jet d'eau* at Chatsworth is, perhaps, the most perfectly satisfactory instance we have, where advantage has been taken of nature, so as to bring it efficiently to the aid of art. Here, we may say, in the words of Shakspere,—

> "Is an art
> Which does mend Nature—change it, rather;
> But the art is Nature's self."

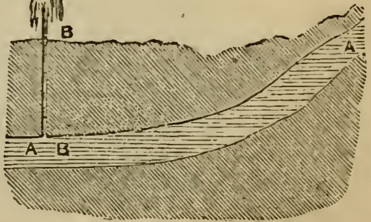
219. In the gardens and pleasure-grounds of this princely residence, which, in the words of its poet,—

> "Stands in the middle of a falling ground
> At a black mountain's foot, whose craggy brow
> Secures from eastern tempests all below,"

advantage has been taken of the heights in question to collect the waters in a lake at a great elevation, and connect them with the *jet d'eau*, which forms the Emperor Fountain in the centre of the grounds. This magnificent and massive column of water rises, by its own natural force, 297 feet—the largest artificial *jet d'eau* in the world. The nearest approach to this is the Wilhelm Fountain, at Hesse-Cassel, which rises 190 feet. At St. Cloud the jet rises 160; that at Peterhoff, at St. Petersburg, 120, and the Old Fountain at Chatsworth, which supplies the copper-tree and other deceptive water-works at that palace, rises 90 feet,—the height, also, of the principal *jet d'eau* at Versailles. The lake which supplies the fountains at Chatsworth covers eight acres of ground, having been enlarged by artificial means when the Emperor Fountain was laid down; but so great is the demand upon it, while the fountain is in operation, that a foot of water disappears every three hours.

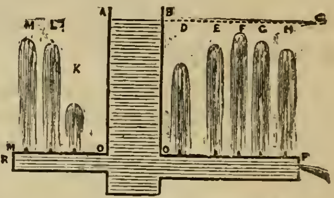


220. Water, unless interrupted in its course, will, in ordinary circumstances, find its natural level; that is, if a body of water underlying an impervious stratum of clay, as A A, is pierced, and a tube inserted at B B, the water will rise in a jet to the highest level of the water, A. Or a glass tube, having a funnel-shaped mouth, carried through the cork of the jar B, and a small tube, C, inserted in the same cork, so as to be in free communication with



the fluid poured into the funnel; when the jar is filled, it will flow out in a jet so long as liquid is poured into the funnel, the jet being proportioned in height to the height and diameter of the tube.

221. Jets exceeding the fifteenth of an inch in size never attain the natural surface-level; friction at the orifice, the diffusion of the power by the spreading of spray, and the resisting power of the atmosphere, all tend to prevent its doing so. Great jets rise higher in proportion than small, except when the horizontal tube leading to the orifice of the jet is very narrow, when small jets rise highest. The form of the orifice also influences the height of the jet, as was ascertained in a series of interesting experiments made by Mr. Brisson, to test the power of water. He prepared an upright vessel, A B, with a narrow horizontal tube, O R, on one side, and a larger horizontal tube, O P, on the opposite side. The first was perforated with three simple orifices,—M two lines, L four lines, and K eight lines, in diameter. Turning on these jets, the first rose 9 feet 11 inches, vertically, the second 9 feet 7 inches, and the last, 7 feet 10 inches. In the larger horizontal tube, O P, he made five small orifices; D, with a cylindrical orifice 70 lines, which rose 9 feet 1 inch, vertically, and 9 feet 3 inches on an incline; E, from a conical orifice 94 lines by 70, rose 9 feet 6 inches vertically, and 9 feet 8 inches on an incline; F, G, and H rose respectively, with simple orifices of eight, four, and two lines, 10 feet 6 inches, 10 feet 5 inches, and 10 feet, vertically. It thus appears that the smaller cylindrical tube was the least effective; that the conical orifice threw the fluid much higher, and the simple orifice, with the largest opening, the highest of all. Practically, a jet will rise to within a few inches of the bottom of its fountain-head. For the artificial cascade, the water-service need not be higher than the point at which it flows over the ledge or lips of the tazza; the ledge should be perfectly level, in order to keep up a regular flow of water: a notch or other irregularity would destroy the cascade and produce a stream. On the other hand, if it is to be forced upwards, the bottom of the fountain-head must be some inches above the point to which the jet is to rise, and the supply-pipe should lead from the lowest part of the basin, descending in a continuous and uniform line, without break or bend, to increase the friction. Any such departure from the direct line must be calculated in the result; the usual calculation being that a head six inches in diameter will force a column of water up a jet one-eighth of an inch in diameter. Where iron pipes are used, the deposit of calcareous matter soon stops them up; they are useless, therefore, when less than three-inch pipes, unless coated, outside and in, with John's, or some other composition for preventing oxidation.



BRISSON'S FOUNTAIN.

222. When the jet is to be forced higher than the fountain-head, mechanical force becomes necessary, either to pump the water to a higher level, as at the

Crystal Palace, or by means of the hydraulic ram, a machine contrived to raise water by its own momentum—a sort of reciprocating process in which a comparatively small quantity of water is forced up at a time; but the process being continuous and self-acting, great aggregate results are obtained. By this process the *jet d'eau* in the gardens of the Nymphenberg at Munich rises to the height of 90 feet. These few remarks will readily account for the failure of all attempts to introduce effective fountains into our public places. According to our system of finance, public money cannot be applied in any considerable amount to such purposes; and without a large expenditure no grand result can be attained. Should the public ever take the water-supply of London into its own hands, and a man of genius have the management, very grand effects might be produced at a trifling cost, and enormous public savings effected,—especially if it could be accompanied with a comprehensive plan for isolating the water-pipes from all communication with waste gas.

223. Thus it is only where the pleasure-garden is surrounded by high grounds that effective fountains can be constructed. It was by taking advantage of the rocky slopes of the Apennines, in the neighbourhood of Tivoli and Frascati, that the Italian villa gardens became such noble models for terraces and fountains. The Villa d'Este, beneath Tivoli, although its terraces are crumbling to ruin, and its fountains dry, is yet a wonderful creation of art, which could only have existence on the declivities of a hill-side. But, though the fountain can only act where the water lies at a great elevation, or can be forced up by artificial power, there are other forms in which water becomes ornamental in a garden, as well as useful.

224. Where water can be obtained from a higher level than the garden, after having performed a *tour de force* as a jet in the vicinity of the house, it may be made to descend to the lower level of the grounds, step by step, until it finally feeds shallow canals, constructed for growing such ornamental aquatic plants as require the stimulus of running water. Mr. Noel Humphreys has proposed an ingenious design for forming an ornamental canal of this kind, of which the engraving at the head of this chapter is a copy. The basin is supposed to have stone or cement dressing of an architectural character. On each side is a small and still shallower canal, prepared for the reception of the rarer aquatic plants for which more careful treatment is required. In these canals receptacles are prepared for the soil, sufficiently massive to retain their places, or having spaces left in the bottom for the reception of a basin in which the soil is placed and the root planted; it is then sunk into its place at the bottom of the canal, and the cover, B, fitted into it, and, in due course, the plant throws up its stem through the apertures in the lid. The soil is thus kept in its place, and the water remains pure, even amid considerable agitation. The basin and canals might be formed of Portland cement, moulded into architectural form, or the coping might be of the ordinary dressed freestone of the quarries. The water enters at the upper end, being obtained either from the

overflow of some fountain at a higher level, or from an Artesian or other well. It flows in a thin sheet over a dam forming a gentle cascade; flowing away in a similar manner at the lower end, being so contrived that only as much is drawn off at one end as is permitted to enter at the other. Gravel walks surround the basin, with weeping willows and other drooping trees, for shade and shelter.

225. The first requirement for the formation of a basin of this kind is water. A small brook or spring, in the absence of water at a high level, or an Artesian well, as we have said, is necessary, the water from either source being brought under ground to the head of the basin. A level spot being selected in the lower part of the grounds, and care taken to secure an outfall for the water, the larger basin is excavated to the depth intended. The design is supposed to be 24 feet wide by 48 long, the excavation for the basin 2 feet 4 inches, and for the side compartment 1 foot 4 inches. When bottom and sides have been rendered perfectly smooth with the spade, and made quite dry, a bed of concrete is laid down, 8 or 10 inches thick; over this, layers of tiles in Portland cement are laid. In the gardens at Gore House four such layers of tiles are placed round the bottom and sides. When perfectly dry, a coating of cement will complete the basins.

226. The walls separating the basin from the side canals are single-brick, laid across, set in cement, and covered with cement when dry; the parts designed for the entrance and exit of the water being formed in the same manner. The moulding is now formed by running the moulding-tool along the whole, while the cement is soft, in a manner well known to every workman.

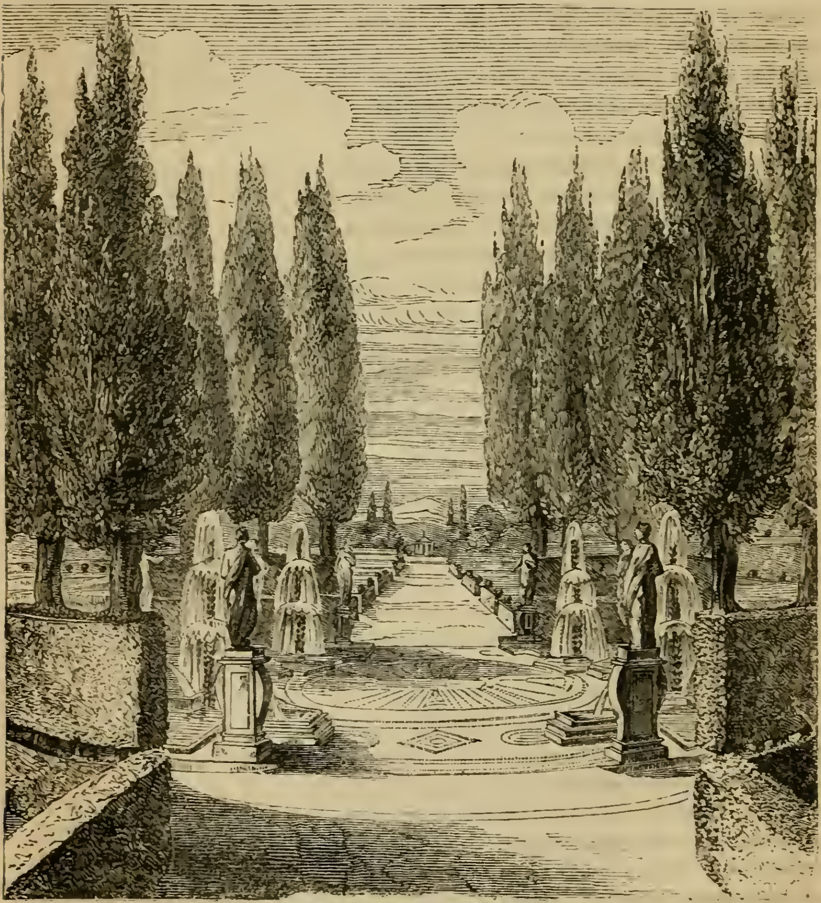
227. This, of course, is a case where brick or tiles and cement are used; where stone is the material employed, the stonemason will be employed to dress the stone after the design of the architect.

228. A canal of geometric figure, such as has been indicated, should be surrounded by a broad gravel walk, approached by other walks of some length, marked by vases on pedestals, or other semi-architectural design, with geometric flower-beds and some shrubs, so placed as to conceal it from the rest of the pleasure-grounds. The plants for the central or deeper canal may be our native water-crowfoot, the marsh marigold, white and yellow water-lilies, frog-bit, floating plantain, and other hardy exotics; in the shallow side slips, the yellow iris, the flowering rush and arrow-head, and the greater and lesser water-plantain, and the elegant Cape arum.

229. But this does not necessarily exclude more formal geometrical flower-gardens. On the contrary, in the immediate vicinity of such a piece of water, side-walks, lined with yew, privet, or holly, might be made to lead to a circular grove of newly-planted poplars and cypresses, surrounded by closely-cut square hedges of yew; the centre occupied by a geometrical flower-garden, where certain shade-loving plants, which suffer from the sun, might be cultivated. If the ground happened to be on different levels, much interest might be added by training the water in gentle cascades round such a garden, before it reaches the basin. Stages for vases and ornamental flower-pots might be

placed, and in the rear it might lead with propriety to more tangled meanderings, where Art need not strive very hard to conceal itself.

230. As a means of removing the impression of flatness, which the geometrical flower-garden is calculated to convey where bounded by walls, Mr. Humphreys has suggested the introduction of formal groups of tall trees, such as poplars or cypresses, where the climate is not too severe for them. "I will imagine a space," he says, "only suitable to one group, which in this case would, of course, be central. The hedges might be privet, some of the new berberries, or other quick-growing evergreens; some hardy tree of spiral growth suited to our climate should take the place of the 'sky-cleaving cypress' of the Italian gardens. By this means the monotony of the geometrical flower-garden would be broken up and turned by a few lofty and finely-grouped objects. Other advantages would also be gained; for instance,



THEATRE OF CYPRESSES.

within the newly-inclosed circuit of tall trees there would be a space where certain plants, which suffer from too much sun, might be successfully cultivated; and even on the north side of these trees, certain shade-loving flowers would find an appropriate situation. A certain degree of intricacy would also be attained, which is always agreeable. Something choice would be imagined beyond the well-hedged circle; and, in reality, beyond it, on either side, would be certain partially-covered portions of the flower-garden. As a good centre to a geometric plan, an imitation of the Italian theatre of cypresses, copied from the gardens of a celebrated Italian villa, could not be otherwise than effective and agreeable; it would also be a novelty in modern gardens, where dislike to cropping has run into the other extreme, and bowers, avenues, peacocks, and other formal figures clipped in yew, have been swept away with relentless rigour."

231. *Fishponds.*—The monks of old well understood the management of fishponds, and near the ruins of many an old abbey may be found traces of them, now neglected. It is found that in certain waters and soils the fish breed, but without increasing in size, while in others the reverse is the case. The cause of this remains a mystery. Fishponds may become a costly luxury; but where water exists already, it might as well be utilized, and such a basin as we have described might be readily adapted to the purpose. Fish cannot exist in foul or impure water; therefore, no dead leaves or rotten branches should cumber the pond. Shrubs and flowers growing at the sides and on the surface should be kept trim and neat, and decayed flowers and leaves raked carefully off. Shelter of some kind should, however, be furnished, to keep off the glare of the noonday sun, if the fish are to increase and multiply, and food must be supplied also. The Chinese excel all other people in the care they take of their fishponds, and the favourite food is said to be an egg broken and put in the water. Overshadowing trees on such a basin as we have described would be inadmissible: the foliage of water-plants or artificial rock-work must here serve the purpose. But in a more natural pond or river, trees rooted in the bank, and overhanging the water, give a grateful shade and shelter to the fish.

232. Rock-work is a natural adjunct to water, and requires its aid to render it perfectly successful where ferns are to form one of its accessories. Rock-work, where it is artificial, is usually raised as a screen between two styles of gardening, or as a surprise to the visitors. Where it is wholly artificial, large mounds of earth, sometimes mingled with roots of trees, are formed, over which angular masses of rock are placed,—in apparent confusion, but with real symmetry; some of them advancing beyond the line, others receding, so as to conceal their more artificial foundation. A running stream, even where it only trickles over the rocks, is necessary to complete the deception, and produce healthy-looking ferns; but there are other rock-plants where a warm dry soil is requisite. Here, walks curving round the base of the rocks, and winding up the mimic cliffs, with rustic balustrade and trellis-work, on which climbing roses, clematis of various sorts, glycines, and other climbing

plants, or the humbler Alpine creepers, are festooned. The graceful yellow broom, the double-flowering furze, and the hardy cistuses, may be planted among these rocks. The detached pieces of rock should, if possible, be blocks of the real stone found in the neighbourhood. Attempts have sometimes been made to imitate or make models of real Alpine scenery, but with indifferent success, as may be supposed. In this manner, however, Lady Broughton chose a model of the mountains of Savoy for imitation in the rockery at Hoole House. With great trouble she succeeded in preserving the outline, imitating the Mer de Glace, in grey limestone, quartz, and felspar. After labouring for six years at this rocky boundary to the flower-garden, it is described as an exquisite piece of workmanship, completely covered with rare and beautiful Alpine plants, except where snow, glaciers, and the pinnacles of rocks are present; and these two first are represented by glittering spar and white marble. Each plant is placed in a bed of soil of suitable character, and protected by broken fragments of stone, clean-washed gravel, moss, and other suitable materials; stones being selected for certain subjects, according as they reflect or absorb the heat. Among the plants which abound in this rocky bed are saxifrages, cedums, rock pinks, anemones, myosotas, heaths, violas, Lychnis alpina, campanulas, oxales, hepaticas, anagallas, cyclomens, calceolarias, dwarf veronicas,—in short, every gem of the garden which will grow in such soils, is to be found in this choice rockery.

233. A valued correspondent sends us the following hints, with which we conclude our remarks on Fountains:—"Even where fountains are not attainable, tanks are not only useful, but may be made exceedingly ornamental, either in flower- or kitchen-garden. The position in the latter should be in the centre of a broad grass walk lined with pear-trees and standard roses as described above. It should be made with an asphalt composition, and surrounded by rockwork covered with cedums and the different kinds of saxifrage. In the flower-garden its position must be determined by circumstances. It forms a useful and beautiful centre to a hardy fernery; and, if near enough to the house, may frequently, at a very small expense, be provided with a fountain by means of a small gutta-percha tube in connection with the cistern, which is supplied by the force-pump of the house. This tube should be so managed as to be removable in winter, for fear of frost."

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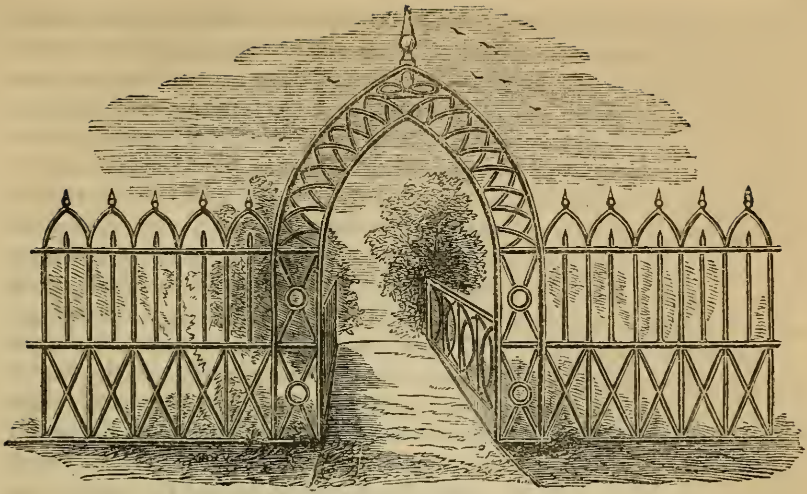


ARCHED RUSTIC BRIDGE.

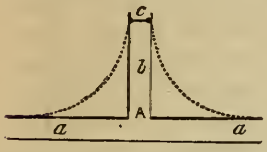
CHAPTER IX.

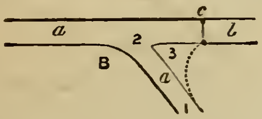
ROADS, WALKS, AND BRIDGES.

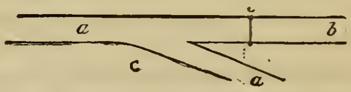
234. THE possession of property confers a right of way, and this right of way, combined with man's gregarious nature, warlike propensities, and commercial necessities, has originated the necessity for, and covered the earth with, roads. Peace and war have run a neck-and-neck race in the matter, and Alexander, the Cæsars, and Napoleon, have vied in road-making with the Telfords, McAdams, and Stephensons. The great Roman roads stretched, it is said, a distance of 6,000 miles from the capital, and so well made were they, that some of them are still in existence ; Napoleon's great Simplon and Mount Cenis roads eclipse in dignity and grandeur any of our turnpikes, and are worthy of being compared with George Stephenson's iron pathway for his fiery locomotives across Chat Moss. It is also worthy of remark, that the very principles upon which railroads are formed were those adopted by the Roman engineers. They made a straight nearly level road between two localities, throwing down mountains, filling up valleys, tunnelling through or bridging over all obstacles in their path. To be enabled to reach distant places by the nearest route, with the greatest ease, in the shortest time, being the main principles of perfect transit, it will be useful to bear this in mind while treating of the formation of roads and walks. A carriage-road, for instance, should always appear to be the best and most direct route to the house. If this principle is not violated, it matters less whether it is long or short, straight or curved, level or undulating, carried through parks stocked with bounding deer or noble woods abounding with game ; but let it once become obvious that the road is unduly lengthened for the sake of effect, and the charm vanishes at once,—the same scenery that

delighted and pleased becomes tame and tiresome. There is no good reason, however, why the carriage-road may not be carried through some of the most picturesque scenery, and rendered as interesting and commanding as is consistent with convenience. A distant glimpse of the house may sometimes be permitted with excellent effect, satisfactory to the eye for its beauty, and to the more utilitarian principles, as indicating a termination to the journey.

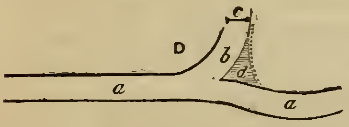
235. Nothing contributes more to the importance of a carriage-road at starting than its line of divergence from the public road. The farther the angle of separation can be removed from a right angle, as at A, the more graceful will the entrance be; thus, at A, it will be seen the carriage-road *b* cuts into the public road *a a* at right angles. Any inclosure following the lines in the diagram would be stiff and formal; but by throwing an ornamental fence where the dotted lines occur, and the space between the road and railing laid down in grass, the offensive impression of stiffness is removed. In other cases the carriage-road should be made to diverge from the public road *a b*, leaving the angle 3 cut off by dotted lines from *c*, fig. B.

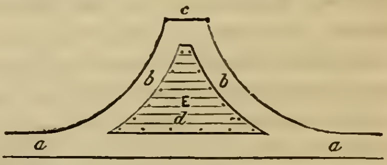




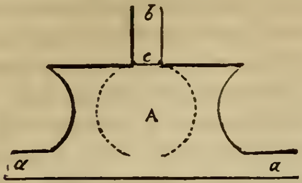


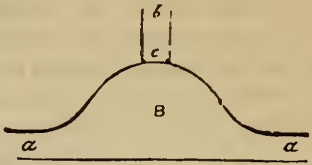
The same remark applies in fig. D, although in that instance the public road *a a* diverges with a curve as well as the carriage-road; still, it would be improved by a curve dating from the dotted lines *d*; while in fig. E, which has a double approach, the longer the curve *b b*, and the larger the space E, inclosed with dotted lines, the more graceful is the sweep *b b*; in fact, in all these instances, the nearer it can approach a parallel line with the main road, as at *a b*, the better. But whatever the angle of divergence chosen, a liberal space should be left outside the entrance-gate: the form of the space is of less consequence than its size. At E a piece of grass is shown, protected from the public road by upright stones, or wooden posts, inserted all round, and connected together by a massive iron chain. The forms C D would also look nobler, and be much more easily entered from both directions, if the spaces beyond the dotted lines were thrown into the public road; and unless this is done, it is exceedingly difficult to turn the corner at 3 in coming from 1 to 2, in fig. B. Where a domain is sufficiently ample to require two or three lodges for its accommodation, this is of less consequence. In cases where the form is a



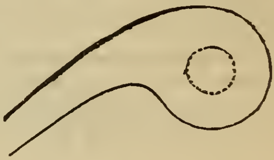


parallelogram, the gate *b c*, lying off from the public road *a*, as in fig. A, the form is improved by giving it the curve at each end of the parallelogram, and central grass-plot, whether inclosed or not; it would be both graceful and rendered easier of approach, by having an elliptical sweep, as in B, from the public road *a a* to the gate *c* and carriage-road *b*. The great points are to secure abundance of space for convenient ingress and egress, and convey, at the same time, the idea of liberality in the disposition of private property.

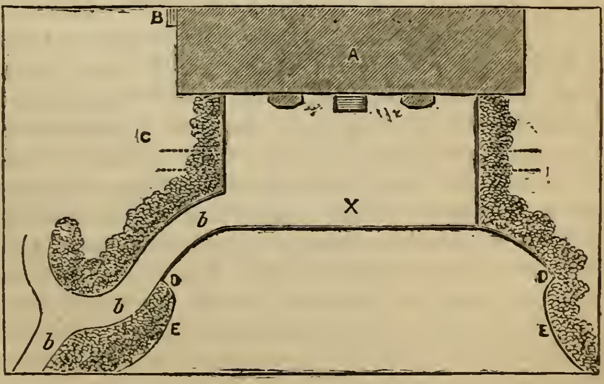




236. Similar principles ought to govern the shape and extent of the gravel in front of the chief entrance to the house. In the plan given at page 53 this is shown as a circle; but an ellipsis, square, parallelogram, the form of a pear, thus, or any other shape, such as an irregular octagon or hexagon, may be chosen at pleasure, provided only the space is large enough. Where a house is close to a public road, the centre of the gravel is often planted with shrubs, as indicated by the dotted circle. The size must likewise be in proportion to the magnitude of the house and the nature of the traffic expected: a ducal residence might demand 3,000 square yards; for the house of a quiet country squire 500 would suffice,—it should never be less than 300; from 400 to 500 yards is a good medium. A circular or oval form has the advantage of being easier kept, and of enabling carriages to turn within a smaller compass than any other shape.



237. In the plan annexed, the carriage-road *b b* approaches the house A, through a winding shrubbery, which conceals the stable-yard C, on the left. The space in front is an oblong, sixty yards by thirty, supported by a retaining wall, D D, seven feet high from the park, and three feet of open stone-work, with massive coping from the inside, terminating in the shrubbery and wire



fence E E. The wall runs up to the house at both ends, and is ornamented with handsome vases; generally the entrance to the carriage-front is most convenient at one end, as shown here, or in the centre of the space, as indicated by the dotted lines. When the stables are placed at the opposite end of the house, the carriage should pass right through, as shown on the plan; occasionally, however, it may be best to enter in the centre of the space opposite the front door, as at X; indeed, no absolute rule can be laid down upon the subject. Whenever grass is introduced in the centre of the space, it will be best to enter in the centre, and drive round the turf up to the door. When the road is carried right through to another gate, and carriages have not to return by the same route as they entered, a smaller space will suffice.

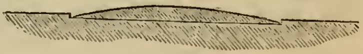
238. The line or direction of the road itself must be determined by the characteristics of the locality and the taste of the proprietor. Notwithstanding all that has been said about a curved line being the line of beauty, I confess to a great admiration for the grand old straight carriage-roads, with their accompanying avenues. Nothing imparts such ideas of magnificence and grandeur to a domain as trees planted in this manner. Deciduous trees are very effective; but an avenue a mile long, of cedars of Lebanon, would confer regal dignity upon any property. The *Cedrus deodora, Araucaria imbricata,* and similar trees, are better adapted for lines than for overhanging arches; but they would look rich and beautiful nevertheless. The *Wellingtona gigantea,* being so hardy, and such a rapid grower, would also do well; and the first nobleman who embellishes the approach to the mansion with an avenue a mile long, with lines of this tree, will immortalize himself throughout all succeeding generations. Those who have seen the magnificent specimens of the common spruce in the grounds of Sandhurst College may try to imagine the marvellous effect of two lines of such trees bounding a carriage-road of this length. Although I would be one of the last to advocate the general and indiscriminate introduction of straight carriage-roads and avenues, yet, in suitable circumstances, I would boldly advocate their formation. Whatever may truthfully be said against the use of straight lines, I have never yet met with any one who did not admire them in vistas, or straight-forward views, in the landscape. In looking from one object to another, the line of vision, which is to us the only line of beauty, is always, to our perceptions, a straight one; the advocates of straight roads are, therefore, not quite so unphilosophical or unnatural as has been supposed; and it is a thousand pities that so many of their grand works have been destroyed by the mischievous zeal of the extreme picturesque school. However, in many cases it will be impossible—and undesirable if possible—to make roads straight; they must be boldly and tastefully curved. The extent and form of the bend must, to a great extent, be controlled by the width of the road. I think it is Repton who lays it down as a principle, that no two sweeps shall ever be visible from the same spot; for a curve that might by itself look beautiful and bold, even in a narrow walk, might look puny and poor on a wider road when thus repeated.

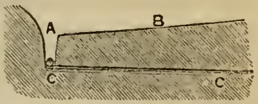
239. Another principle, of great importance, is, that the curves must not

appear to be capricious: the shape of the grounds must be so arranged as to be furnished with trees and shrubs. The direction must appear to be the best for reaching the house; commanding views of beautiful scenery must be introduced, giving apparent or real design to every bend on a road. Neither must the same curve be too often repeated; this would show poverty of invention, and become tiresome and monotonous. Keeping these principles in view, and adapting the curves to the nature of the surface traversed by the road, almost any possible line of inclination, from a square to an arch, may be used with propriety. Neither is a curved road necessarily so much longer than a straight one. Edgeworth, in his "Essay on the Construction of Roads," says, "A road ten miles long and perfectly straight can scarcely be found anywhere; but if such a road could be found, and it were curved so as to prevent the eye seeing farther than a quarter of a mile of it in any one place, the whole road would not be lengthened thereby more than 150 yards."

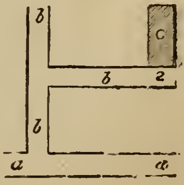
240. If it were possible, it is not often desirable to make roads level, nor of one uniform gradient throughout. Undulations are charming to the eye, and give intermittent seasons of work and rest to the horses. No angle of ascent, however, on a carriage-road should exceed 1 in 25, and 1 in 30 or 40 is better; for the first is rather too steep, in fact, to drive rapidly up and down with perfect safety; the latter gradient is as much as we could recommend.

241. The surface of roads should be slightly convex, thus. When formed across a steep hill, they may often incline two, three, or four inches towards the hill, as at B. This is an excellent shape in such positions, as it throws the whole inclination of the carriage towards the safe side. Carriage-roads may vary in width from 12 to 24 feet,—they are sometimes only 8 or 9; but this gives a mean appearance to a place: they should never be less than 12, and need seldom be more than 18 feet wide. For a 12-feet road, 3 inches of convexity will be enough; an 18-feet road would be the better for 4 inches.

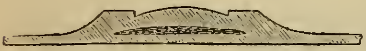




242. Except where it proceeds direct from a public road, the back road to a house should always diverge from the carriage-way at right angles with it. It should also be, say two feet narrower than the carriage-road, and should leave it at some considerable distance, so as to be out of view of the house; it may then proceed by the nearest route to the stables, kitchen-garden, and kitchen court, terminating on the gravel at the kitchen door: it will thus answer the double purpose of a back- and stable-road. Where the above hints are not attended to, the back road is sometimes mistaken for the chief carriage-road. I lately visited a place laid out by a famous landscape-gardener, and nearly passed the mansion without perceiving it: the carriage-road proceeded in a straight line to the farm in the direction of *b b*, and branched off at a right angle to the dwelling-house at *b* 2.

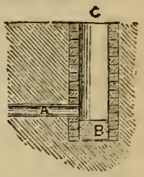


243. Having designed the line of roads and paths, and form, termination, and entrance of a road, the next operation *is to make them.* The first process is to remove the top spit of soil to a depth of 6, 9, or 12 inches,—although some road-makers say 15, and even 18,—according to the nature of the subsoil and the quantity of hard material that may be available to form the road; about 9 inches or 1 foot will be a useful average depth. The crumbs of soil should also be thrown out, leaving the surface smooth and hard for the reception of the stones. Some recommend the bottom to be of the same shape as the top, others recommend it to be level, and some contend that it should be convex in the middle, so that by placing the roughest materials there, the crown of the road is kept dry. On wet soils, drainage of some kind will be necessary, and drains may be inserted on each side, or in the centre, or on one side only, according to the form of the ground, the disposition of the strata, and the direction of land-springs: the great point is to keep the bed of the road dry; and therefore the drains should always be sunk a foot or more below the solid earth on which the road materials rest. Roads are less injured by surface-water than is generally supposed; if well formed, they become almost impervious to water falling upon them; but no road can continue sound which rests upon a soft spongy foundation: hence the necessity of intercepting and carrying off all ascending water. A carriage-road always looks best when it is placed at the same level, or nearly so, as the ground it passes over: but when it has to be carried over marshy ground, to make a sound road, it has to be raised above the surrounding level, as here shown. The space occupied by the dark lines may often be advantageously filled with faggots of wood: these not only afford an excellent base for the hard materials of which the road is formed, and efficient drainage, but impart a marvellous degree of elasticity to the road itself. Neither is the effect so evanescent as might be supposed: a road thus formed will be less noisy and more elastic than an ordinary road, and last at least half a century. But whatever the nature of the bottom, from 9 to 12 inches of hard material, consisting of three layers of different-sized stones or gravel, will be necessary. Within certain limits, the smaller the stones are broken, the smoother and more durable the road will be. The bottom layer may consist of some 3 inches in diameter, weighing 7 or 8 oz.; the second layer 2 inches, weighing 5 to 6 oz.; and the top layer of clean binding gravel. The layers may be all of the same depth, or the bottom be 5, the second 3, and the tŏp, of gravel, should never be less than 4 inches in thickness. Such a road, well raked and olled until it binds, and properly kept afterwards, will last for an indefinite period. Good roads may also be made with concrete for their foundation or their chief material, covering it with 3 or 4 inches of good gravel on the top. In districts where chalk or lime is plentiful, and the soil and subsoil tolerably dry, perhaps a concrete road, from 5 to 6 inches thick, with its surfacing of gravel, would be the cheapest and best of all roads. Various descriptions of wood and iron pavements, and every variety of stone, have been recommended



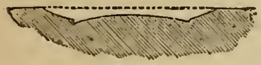
for roads, but none of these are suitable for carriage-roads, which, in all cases, require that high finish which a gravelled surface alone can impart. At the same time, the character of the material used must of necessity vary with the character of the district; in many parts of the country nothing can be had but flints, and the harder and tougher flints are good materials for the bottom and body of a road. The best road materials, however, consist of the different varieties of greenstone, basalt, porphyry, limestone, and granite, broken into small square pieces. Some recommend a large admixture of chalk, but this is not generally approved of, and certain it is that good road-metal binds equally well without it.

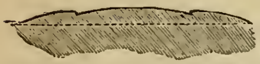
244. Generally, it will be desirable to furnish gratings on the sides of roads for the removal of the surface-water; in no case, however, should these gratings communicate directly with the drains, as the sand soon chokes them up. They should consist of a well (C) formed of brick, a foot or 18 inches square, and o sufficient depth to leave a space (B) of 1 foot or 18 inches below the level of the drain (A), for the deposition of sediment; this well, cleared out occasionally, and the drains will work for centuries. Since the invention of Fleming's salting-machine, and the practice of applying dry salt in fine weather for the destruction of weeds, the keeping of roads clean has become both cheaper and more effective. After trying all the usual methods of turning, scarifying, hoeing, and raking the surface, I have come to the conclusion that pickling the weeds off the surface of stones and gravel is the best, where the nature of the edging renders it practicable. This operation performed in spring and autumn, with attention to raking in the ruts, where any are made, and frequent rollings after heavy rains, will keep roads in the highest state of efficiency and cleanliness, and impart that bright sparkling appearance which is an additional recommendation of the salting process. Roads formed and kept as here recommended will seldom, unless the traffic is unusually heavy, require any further repair than an occasional slight top-dressing of gravel. The grass edges on the sides of carriage-roads should never exceed an inch, or at most 1½ inch, in height, and should be neatly cut with an edging-knife once or twice a year, and clipped once a month during the growing season. Nothing imparts such a charm to a road as a sharply-defined well-kept edge, of one uniform height throughout. The best coloured gravel for roads is the reddish yellow, so common in the neighbourhood of London; light shades of gravel impart an impression of coldness to roads, and seldom wear so well.

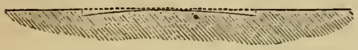


245. Nearly all that has been said about roads is applicable to walks; for roads may be defined as larger walks, made in a more substantial manner, to bear heavier traffic; and walks as narrow roads, designed for pedestrian or light carriage traffic only, bearing the impress of greater refinement and a higher style of finish. With these distinctions, arising from their different uses, the same principles apply to the formation of both. The quantity of material used need not be so great in depth, and its texture should be finer

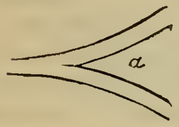
for walks ; but the mode of its application, and the functions it performs, are in both cases alike. A good walk may be formed of concrete, consisting of 6 parts of coarse gravel and 1 of lime, 4 inches deep, with an inch of fine-sifted gravel sprinkled over and well rolled into the top ; and 6 or 7 inches deep, including gravel, will be a good average for walks formed of stones, &c. in the ordinary way. Perfect dryness is even of more importance upon walks than roads, as they should be clean and comparatively impenetrable in all weathers and at all seasons. Although some recommend walks to be sunk below, and others raised above, the general level, as here shown, yet walks generally look best on a level with the surface: they must be sunk half an inch at the edge, to leave this height of verge, which ought never to be exceeded in pleasure-ground walks. Walks themselves should also be nearly level, half an inch being sufficient convexity for a 10-feet walk. The wider the walk the smaller is the permissible rise in the centre, as nothing detracts more from the appearance of a gravel walk, of say 15 or 20 feet, than variations in the level of its surface. A 6-feet walk, with 2½ or 3 inches rise in the centre, would not be so offensive to the eye as the same amount of convexity in a walk 15 feet wide ; all broad terraces and promenades should therefore be perfectly level ; and if the removal of water renders a fall necessary, it should be so slight as to be imperceptible to the eye. For similar reasons, gratings are hardly ever admissible on such walks ; rough stones, or rubble connected with underground drains, cropping out to within a few inches of the surface, being used instead for the removal of surface-water. The longer and wider a walk of this description is, the more offensive to good taste is the incongruous appearance of an obtrusive grating and other petty irregularities of level. These views apply with double force to straight walks, and there are few gardens of any pretensions where either are now to be found. However beautiful curved walks may be elsewhere,—and they are exceedingly beautiful,—they can never be made to harmonize with the straight lines of architecture, and therefore should not be introduced near the mansion. Generally, there will be found plenty of scope for the introduction of both straight and curved walks ; but where there is not, the former should have precedence, and the curved lines be introduced beyond the pleasure-grounds. Notwithstanding the dictum of Shenstone, who was a greater landscape-gardener than poet, perhaps, and who tells us "that when a building or other object has been once viewed from its proper point, the foot should never travel to it by the same path which the eye has travelled over before," I think a handsome seat or temple, a beautiful fountain, or a statue, a pleasing termination to a walk of 100 to 500 yards long. Certainly the rest the seat affords, and the pleasure imparted by the other objects, will not be the less refreshing or satisfactory because we are made aware of their proximity by walking right up to them. The size and

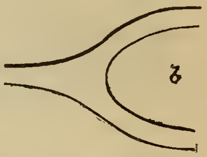


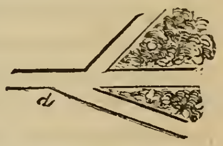




importance of the terminal objects must, however, always correspond in magnitude and importance with the length and width of the walk, and architectural objects only are suitable termini for straight paths. Curved walks may have rustic buildings, moss, root, or heath-houses, of every variety of pattern and design, simple seats, secluded grottos with suitable inscriptions, ornamental bridges of antique shape, and rustic fountains, either as embellishments or as termini to them; for there is great truth in Shenstone's remark, that a rural scene is never perfect without the addition of some kind of building. One of the most effective sights I have seen was a simple rustic structure, with a small aperture in the back, fitted with a frame for a mirror. There was no glass in it; but through the opening was seen one of the most lovely landscapes in this country; and the effect was charming. Generally, a walk should never terminate at any such object: it is unsatisfactory to be compelled to return by the same route as we advance. Other walks should diverge from it, to give the option of choice. The proper line of divergence is of consequence; Repton says, where two walks separate from each other, it is always desirable to have them diverge in different directions, as at *a*, rather than give the idea of recurvity, as at *b*. When two walks join each other, it is generally better that they should meet at right angles, rather than to leave the sharp point, as in the acute angle at *d*. The great thing is to avoid a stiff uniformity, and give meaning to the curves on a walk by judiciously planting firs, limes, &c., as here shown, so as to escape the force of such severe lines as these :—

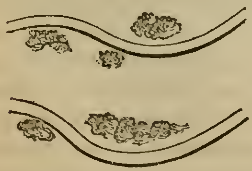


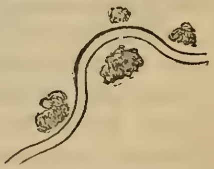




> "Prim gravel walks, through which we winding go
> In endless serpentines, that nothing show;
> Till, tired, I ask, 'Why this eternal round?'
> And the pert gardener says, ''Tis pleasure-ground."

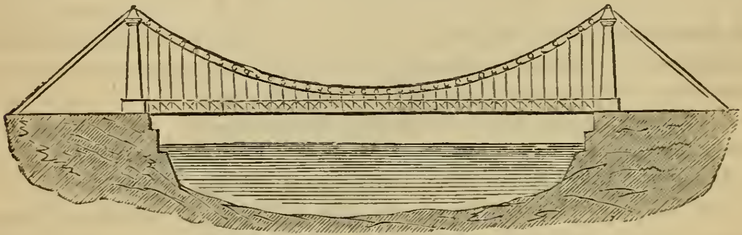
246. Walks should always avoid skirting the boundary of pleasure-grounds, although they may occasionally approach it; and, as a general rule, one should never be *vis-à-vis*, for any great distance, to another; and then they should be of different widths, according to their relative importance; but each walk should maintain the same width throughout, unless it passes through rock-work, when it should be distinguished by irregularity of width, abrupt bends, and capricious undulations; the trim walk should then be lost in rugged attempts at the mountain path, although the idea of safety must still be





preserved. Grass walks are not so common as they were. On well-drained lawns the whole surface becomes a walk at pleasure, and grass walks ought never to be depended upon as necessary routes to or from any given place. When of great length, and 12 or 18 feet wide, however, they have a noble effect. The late Mr. Loudon recommends, where there is much traffic on grass walks, that their bottom should be formed with stone, as if for gravel; but it will be more satisfactory to make good gravel walks for the general traffic, and reserve the grass walks for delightful promenades in fine weather.

247. In reference to statues, rustic houses, bridges, &c., which are often more attractive at a distance than enjoyable when reached, Shenstone's principle of the eye and foot reaching them by a different route may be often applicable. Occasional ruins and bridges may be introduced to please the eye, that are never intended to be reached by the foot at all: it is bad taste, however, to erect a bridge where there is no water, or other apparent reason for its existence, apart from its mere effect upon the landscape; but wherever the nature of the ground requires a bridge, a distant view of it ought to be obtained, as few objects can be made more effective in a landscape. Viewed at a distance, the mind contemplates its features of beauty only; as we approach it, considerations regarding its strength and security predominate. Hence, every bridge in a pleasure-ground, whether formed of iron, stone, or wood, of the most elaborate architectural design or the rudest rustic form, should not only be, but appear at first sight to be, perfectly safe; if there is the slightest doubt on this ground, the whole pleasure of the scene will be lost. Of whatever form or substance the sides of the bridge are made, they should be so high as to prevent any danger of falling over, and so close together that neither child nor dog can fall through. Approaches to a bridge through a raised archway, as in the design at the head of this chapter, are admissible in certain cases.

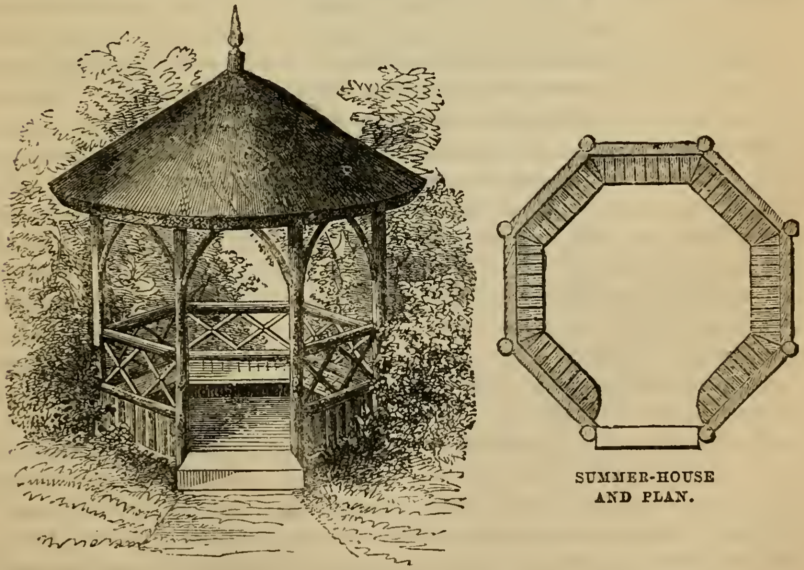

IRON BRIDGE FOR A PARK.

248. Statues are also admissible in garden scenery, and should be large, as they are most effective when viewed at a distance; consequently, the outline of their form should be bold, the drapery rough, and the figure so commanding as to assume its proper proportions at a distance of from 50 to 100 yards from the spectator. The best materials are stone, bronze, iron, and lead, the two latter painted to resemble stone. They are sometimes very effective in alcoves, summer-houses, &c., and sometimes impart the charm of sudden surprise as termini to winding paths.

249. Seats should be provided in every garden, and the state of our atmosphere renders it almost imperative that they should be protected from the weather. Hence the origin of rustic and architectural summer-houses, Doric and other temples, &c. : they are not only ornamental but highly convenient. Under the influence of that peculiar half-painful half-pleasant lassitude which a succession of beautiful scenery so often induces, nothing could be more pleasant than the welcome shade of rustic root-house, cool grotto, or sheltering temple, sacred to Flora, Poetry, Friendship, or Love. Rogers, the poet, used often to sit in an alcove in the garden at Holland House, Kensington, which still bears this inscription :—

> " Here Rogers sat, and here for ever dwell
> With me those pleasures that he sung so well."

And, doubtless, Byron, Campbell, and Moore, have often done the same when they visited this princely domain. Scott and Shenstone were not only enthusiastic admirers, but successful creators of beautiful landscapes; and the latter studded his whole estate with summer-houses, temples, alcoves, caves, statues, obelisks, and seats. According to Dodsley's description of the Leasowes, there were about three dozen of seats placed in the best possible positions, besides the rustic and architectural buildings already noticed; and the majority of them were furnished with appropriate inscriptions. Doubtless this is a legitimate means of deepening the impression arising from the contemplation of beautiful scenery, of inculcating moral lessons, or of setting forth the charms of retirement and rural life. Shenstone, and some others, may have multiplied inscriptions and seats to excess, but



SUMMER-HOUSE AND PLAN.

that is no reason for their total abolition. There is a great want of *sitting* accommodation in most of our best gardens, and yet nothing can be easier to provide. Many of the seats at the Leasowes consist of a single slab fixed at the root of one, or upon the stumps of two trees. Unless in very wild scenery, such seats are scarcely admissible; but stone, wood, and cast iron are available everywhere; and, in many positions, rustic wooden chairs are the most appropriate and useful. In many a secluded nook and shady dell Shenstone's inscription on his root-house might reappear without violating any sense of propriety or infringing upon good taste:—

"Here, in cool grot and mossy cell,
We rural fays and fairies dwell;
Though rarely seen by mortal eye,
When the pale moon, ascending high,
Darts through yon limes her quiv'ring beams,
We frisk it near these crystal streams.

Her beams, reflected from the wave,
Afford the light our revels crave;
The turf, with daisies broider'd o'er,
Exceeds, we wot, the Parian floor;
Nor yet for artful strains we call,
But listen to the waterfall.

Would you, then, taste our tranquil scene,
Be sure your bosoms be serene,
Devoid of hate, devoid of strife,
Devoid of all that poisons life.
And much it 'vails you, in their place,
To graft the love of human race.

And tread with awe these favour'd bowers,
Nor wound the shrubs, nor bruise the flowers;
So may your path with sweets abound,
So may your couch with rest be crown'd:
But harm betide the wayward swain
Who dares our hallow'd haunts profane."

D. T. F.

DECAYED PEAR-TREE.

CHAPTER X.

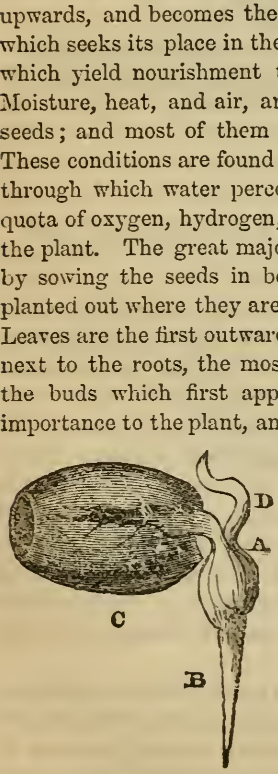
PRINCIPLES OF VEGETATION AND MODES OF PROPAGATION.

250. PLANTS are organic bodies, composed of an outer bark or epidermis, and an interior, consisting of an irritable elastic cellular tissue, through which the sap necessary for its support rises from the root towards the upper part, namely the leaves and flowers. Each cell forms a small closed vesicle, a complete laboratory in itself, through whose membranes the sap oozes by the process of osmosis; they stand side by side filled with most different matters, which never become intermixed. Each of these cells extracts from the constantly passing current of sap those constituents required for its own product, and when its allotted elaboration is completed, they are either passed on again in a fluid state, or reserved for the future needs of some other part of the plant, or they are used to repair or increase its own solidity. Plants are thus possessed of a vital principle, only differing in form and intensity from that of animals.

251. The water-plant *Chara*, through which the sap may be seen circulating in a current of green globules, rising through one set of transparent cells and descending through another, is usually advanced as a proof of this, and the evidence is rendered more convincing if a ligature be tied round the centre: the motion continues as before, but is confined to each end,—two endless chains in place of one. Dutrochet, who was at one time opposed to the theory of vital

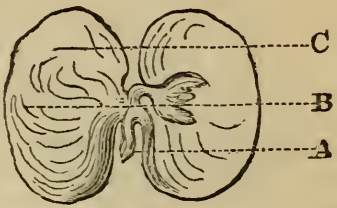
force, advocating the theory of electrical action in place of it, finding that the magnet exercised no influence over the circulation in *chara*, admitted afterwards the doctrine of vital force. The sensitive plant, which shrinks from the touch, the lip of Drakæa which closes under similar circumstances, and the snap of the leaf of Dionæa, are all arguments favouring the doctrine, which is confirmed by the effect of laudanum or arsenic dropped on the leaf of plants, such as the kidney-bean or lilac, or two drops of chloroform placed on the leaf of the sensitive plant, the leaflets collapsing pair by pair at the extremity, but recovering their sensibility after some hours.

252. In a state of nature all plants are propagated from seed, and the multifarious forms of the seeds and envelopes with which they are provided form one of the many interesting subjects of investigation to the lover of nature. For our purpose it is sufficient to state that most seeds are covered with a hard shell or envelope, which protects them from external injury ; that within the envelope lies the embryo plant. All seeds in this latent state contain an organ, or GERM, which, under favourable circumstances, shoots upwards, and becomes the stem of the plant ; another, called the RADICLE, which seeks its place in the soil, and becomes the root ; and the SEED-LOBES, which yield nourishment to the young plant in its first stage of growth. Moisture, heat, and air, are necessary conditions for the development of all seeds ; and most of them require, in addition, concealment from the light. These conditions are found in the open texture of well-pulverized garden soil, through which water percolates freely, and air follows, each yielding their quota of oxygen, hydrogen, and carbon, in a gaseous state, for the support of the plant. The great majority of plants cultivated in a garden are obtained by sowing the seeds in beds suited to their constitution, to be afterwards planted out where they are to grow and ripen their fruits, or seeds, or leaves. Leaves are the first outward sign of germination, and throughout its existence, next to the roots, the most important organ of a plant. The seed-leaves, as the buds which first appear above the ground are termed, are of vital importance to the plant, and, if destroyed prematurely, the young plant rarely recovers ; therefore the leaves of all young seedlings require protection from insects, worms, and slugs, their most dangerous enemies, as well as from severe weather.



253. *Germination* is the art by which the embryo of the seed placed in favourable circumstances, that is, surrounded by moisture and heat, and placed in darkness, throws off its shell or covering, and in course of time becomes a vegetable, resembling that which gave it birth. From the time that the acorn of the oak is placed in circumstances favourable to its germination, it absorbs humidity, the cotyledon A swells, the root or radicle B is elongated, the shell or envelope C is broken. The root isuses by the

fissure and directs itself downwards into the earth; the plumule D erects itself, is disengaged from the shell, and becomes the stem, while the cotyledons furnish food to the young plant, until the first leaves develop themselves and the spongioles of the roots are capable of receiving nourishment from the earth.

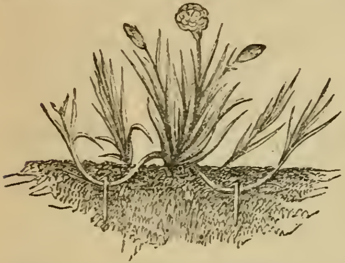


253. In plants with a soft covering, as the bean, the radicle A is directed to the outside of the seed,—it is the rudiment of the root: this is the first part which develops itself in germinating. The plumule B, on the contrary, ascends towards the centre of the grain, and becomes the stem, while the two cotyledons C remain in the soil between the root and the stem, yielding nourishment to the young plant until the roots can perform that office.

254. It is found, however, that except in the case of annuals (as plants raised from seed, which grow, produce their seeds, and ripen their fruit in one year, are called), much time is lost by following this mode of propagation; it is also found that the seed does not always produce the same identical plant; above all, it is found that none of the double-flowering, and few of the herbaceous-flowering plants, with which our gardens are furnished, ripen their seeds in our climate. This led to other methods of multiplying; for, besides the roots properly so called, which attach themselves to the soil, and draw from it the principal nourishment of the plant, it is found that each branch conceals under its outward covering a bundle of fibre or tissue, which, under favourable circumstances, develops roots, and becomes the basis of an independent plant, identical with that from which it sprung. Many plants have also a crown with buds or eyes, each capable of propagating its species. Every plant with roots of this description may be divided into as many portions as there are eyes, taking care that a few fibres are attached to the root, and each will become an independent plant. The Potato, and all the bulbous and tuberous plants, are familiar examples of this principle of propagation; so are the Dahlia and Pæony, which grow better when the set is confined to a piece of the tuber with one eye attached, than when planted whole. So conspicuous is this in the Potato, that, where it is planted *whole*, all the eyes except one, or at most two, are scooped out with a sharp knife; and the only argument on which that mode of planting is adopted at all is that it supplies the young plant with more of its natural pabulum while it is rooting and thus increases the vigour of the young plant.

255. Other plants throw off short stems, like the Daisy and House-leek, by means of which they are propagated. Others again, like the Strawberry, throw off runners, each of which is furnished with its root-fibre already elaborated, only requiring soil in which to root itself. But there are others, where nature requires the aid of art. Propagation by *layers*, which consists in arresting the circulation of the sap on its return to the roots, is one of these. In this

operation an upward slit is made half across a joint; and by fixing the part so cut in favourable soil, the latent fibre expands into a root, and the branch becomes an independent plant. This process is adopted with pinks, carnations (the example illustrated in the engraving), roses, and many other plants. It is, however, a very important operation in gardening, and should be neatly executed. Choosing the suitable branch of a carnation, for instance, which is first stripped of all branches below the joint selected, and being furnished with a very sharp knife, the operator begins his incision a quarter of an inch below a joint, passing the blade through it in an oblique direction to a quarter of an inch above, taking care that the cut terminates as nearly as possible in the centre of the stem: the tip of the tongue thus made is cut off with a clean sharp cut, and the layer pegged down in a little fine rich mould, but not more than an inch under the soil. In the case of carnations, the plant is in a fit state for the operation as soon as the flowering season is over; and no stem which has already produced flowers should be employed for the purpose.



256. In the case of roses, and other shrubby plants, all that is required is to run the knife through a joint sufficiently so to make an opening or crack near it, and plant it three inches below the surface of the soil, securing it there with a peg, pressing the soil lightly round it, but leaving that part of the branch above the soil as erect as possible. The roots will soon form, when it may be separated from the parent tree and planted out.

257. Every tree or shrub which produces buds possesses also the incipient root-fibre already mentioned. The young twigs and branches of such trees, if placed in the ground and properly treated, will readily develop these roots, and become, in course of time, vigorous as the parent plant. This mode of propagation by *slips* or *cuttings* is applied to almost every description of plant, but especially to those which refuse to ripen their seed with us, or which consume years in attaining maturity, as the ordinary fruit-trees do. To be successful in the operation, the cuttings should be made just at the point where the wood of last year's growth terminates and that of the current year begins: it should be removed with a clean sharp sloping cut just below a bud; for there lies the latent root.

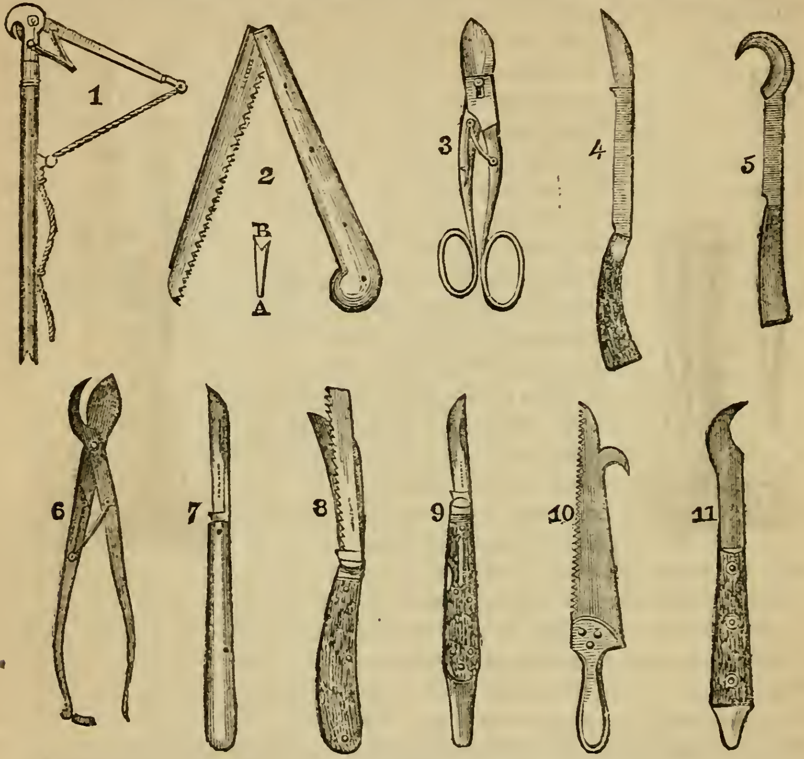
258. In all these operations, warmth, moisture, and air, are equally essential as with seeds; shade is equally so. These conditions must be supplied by means of bell-glasses, shaded from the sun, and slightly tilted for the admission of air: where the young cuttings occupy pots; and by hand-glasses when it takes place in the open ground; care being taken that they are not planted too deep. In the case of camellias, fruit-trees, and hard-wooded plants generally, as well as roses, more elaborate processes, called inarching, grafting, and budding, are adopted. By these processes old fruit-trees, which have lost their bearing wood, or whose constitution qualifies them for growing varieties

of fruit better in quality than that native to the tree, may be renovated by grafting the desired variety on its principal branches, and heading them down by degrees, until none of the old tree remains above the graft. But the chief use made of the principle of budding and grafting is to prepare young trees for planting, by grafting the more delicate varieties on hardier stems of the same species, where that course is necessary, and by grafting trees of too vigorous growth on stocks which will check their vigour when it is desirable to do so. Thus, most kinds of pears, when grown on a "free stock," as the native pear produced from seed is called, have a great tendency to make wood: this tendency science has checked by grafting the Pear on a Quince stock. In the same manner, the Apple is grafted on the Wild Crab, and for dwarf trees on the Paradise stock, and the Peach and Nectarine on that of the wild Plum and Almond; the result being, that when grafted on native stocks, the Apple and Pear are of more vigorous growth and the trees of longer duration, while those grafted on the Quince and Paradise stock come more rapidly into a fruiting state. The first is also preferred for dry and less fertile, as the second for more rich and fruitful soils; there are also some varieties that in all cases do best on the free stock. These processes are extremely interesting in themselves, and a general knowledge of their principles indispensable to an acquaintance with the art of Gardening.

259. Gardening ingenuity has invented many kinds of grafting: we shall only describe a few of these processes, in order to explain their principle. Select a suitable stock, whose height will be according to the purpose for which it is intended, also a graft, which should be from an early branch of the previous year's wood which has ripened under an August sun, so that the wood has been thoroughly constituted before the early frosts set in. It should also be selected so that the graft is in the same state of vegetation with the intended stock. Where the texture of the wood is less advanced in the graft than in the stock, the latter intercepts the descent of the pulpy sap, and forms the bulging on the stem which is observable on so many trees; when the case is reversed, the swelling occurs in the branch above the graft; for the principle of the union is, that the pulp from the scion descends to the point of junction, where, being excluded by the ball of grafting-wax, which surrounds it, from the light and air, it forms woody fibre in place of the roots which it would have formed in the soil; in the mean while, the sap from the stock rises into the graft, where it is elaborated into pulp by the action of the leaves, and returns again, but in a more consistent state. It is necessary, therefore, where the graft selected is in a more advanced state of vegetation, to detach it from the parent stem, and bury it in the ground, under a north wall, until both are in a similar state: the graft will here remain stationary while the stock is advancing.

260. *Grafting and Budding.*—In gardening nomenclature, the term "stock," or "subject," is applied to the tree on which the operation is performed; that of "graft," and sometimes "scion," to the portion of the branch which is implanted on it. The implements necessary for the operation are,—a hand-

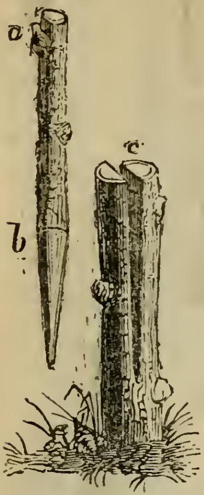
saw, sometimes made with a folding blade, the peculiarity of which is, that the blade should be thin at the back, with very open teeth, A B; a grafting-knife, with a chisel and mallet bevelled on both sides, used where the graft is too large to be cut by the knife; also a supply of small quoins, or wedges of hard wood, to keep the slit open while the graft is preparing. The grafting-knife is furnished with a smooth spatula, of hard wood or bone, at its lower end. A bundle of coarse hemp, or worsted thread, or of willow bark which has been softened and rendered pliable by being soaked in water, and some composition which shall protect the graft from the atmosphere and from rain; these complete the appliances necessary in grafting. There are several such compositions sold in the shops, some of them patented, others secret compositions; but many good gardeners are contented to use well-tempered clay, that is, clay of which the silicious or calcareous particles have been washed out, and pure clay only left. French gardeners use a paste composed of 28 parts black pitch, 28 parts Burgundy pitch, 16 parts yellow wax, 14 parts tallow, and 14 parts yellow ochre.

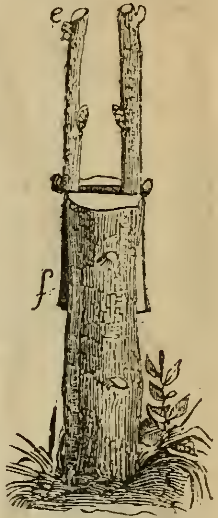


1. Averancators, six feet long.—2. Folding Pruning Hand-saw, with tooth, A B.—3. Bow-slide Pruning-shears.—4 & 5. Gooseberry Pruning-knife, straight and hooked blade.—6. Hand-sliding Pruning-shears.—7. Pruning-knife, with straight blade and smooth spatula.—8. Pruning-knife and Saw.—9. Budding-knife, buckhorn handle, with ivory spatula added.—10. Gentleman's improved Pruning-saw, with Bill-hook.—11. Grafting-knife, with strong curved blade serving as a chisel, with spatula added.

This mixture is applied in a hot liquid state, but not so hot as to affect the tissues of the tree; it is laid over the graft in coatings by means of a brush, until sufficiently thick for the purpose.

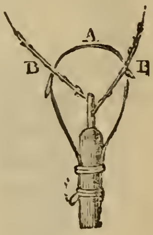
261. In *Cleft* or *Tongue-grafting*, the crown of the stock is cut across, and a longitudinal wedge-shaped slit, *c*, is made about four inches long, according to the size and vigour of the intended graft; this cleft is kept open by a wooden wedge until the scion is prepared. The scion is then selected, having a bud, *a*, at its summit; and the lower part of it is shaped with the knife so as to fit the slit in the stock. The double-tongue graft only differs from the first in having two grafts in place of one; and it is preferable, when the size of the stock permits of its use; the wound heals more quickly, and the chances of success are greater than in the single graft.





262. In placing the graft, it is to be observed that the top, whether single or double, should incline lightly inwards, as at *e*; thus leaving the lower extremity slightly projecting, as at *f*, in order that the inner bark of the graft and stock may be in direct contact with each other. Finally, bind the whole, and cover it over, from the summit of the stock to the bottom of the cleft, with clay or grafting-paste, as directed in par. 259.

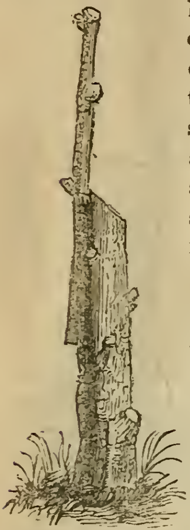
263. In *Double-grafting*, where they both take, it is necessary to suppress the least vigorous as soon as the wound is completely closed, especially in the case of standard trees; otherwise the head gets formed of two parts completely estranged from each other. During the first twelve days after the operation, protect the head from the action of the air and the heat of the sun by some kind of shade. A square piece of paper, twisted into the shape of a bag, such as grocers use for small quantities of sugar, answers very well for this purpose, protecting it at the same time from the attacks of insects; and when they begin to grow, protect the graft from being disturbed by the wind, or by birds lighting on it, by attaching it to some fixed object. A perch formed of an osier rod, having both ends tied firmly to the stock, and having the young shoot attached to it, as in the engraving, will serve both purposes.

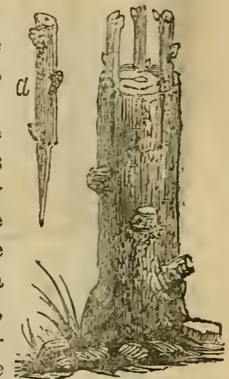


264. When the young scion begins to grow, it is necessary to suppress all buds which develop themselves on the stem, below it, beginning at the base, and

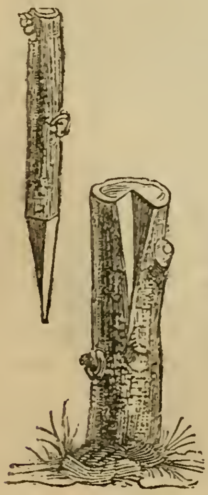
advancing progressively towards the young scion, but in such a manner as not to destroy those near to it, until it has thrown out branches an inch and a half or two inches long.

265. A very neat mode of grafting, called by the French the "Bertemboise graft," is described and figured by M. Breuil. Cut the crown of the stock at a long bevel, leaving only about an inch at the top square, cutting out an angular piece to receive the graft, and operating in all respects as in the former instance. When the stock is not large enough to receive a graft on each side, this mode is preferred, as forming the neatest union, as well as the most rapid; for all the ascending sap is thus drawn to the summit of the bevel on which the graft is placed.





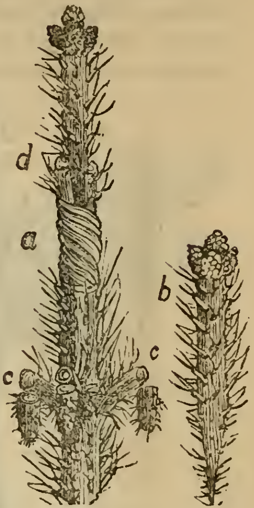
266. A graft, honoured with the name of Theophrastes, is sometimes practised on trees having healthy roots, where it is desired to improve the fruit. Having cut the stem of the tree itself horizontally, or selected a single branch to be operated upon, about twenty inches from the principal stem, three vertical cuts are made in the bark, at equal distances from each other, about an inch long. Having selected three or more grafts, *a*, and shaped their lower extremities into a tongue somewhat like the mouthpiece of a flageolet, with a neck or shoulder at the upper part, then introduce a graft under the bark of each vertical cut, raising the bark for that purpose with the spatula of the grafting-knife, and placing each graft in such a position that the inner bark of the graft is in immediate contact with the inner bark of the tree. When neatly arranged, bandage the whole, and cover with the grafting-paste.



267. *Slit-grafting.*—In place of the vertical cut through the whole of the stem, in this process a triangular cut is made in the side of the stock, as in the engraving; the lower end of the graft is then cut so as to fit exactly into the gap made, so that the inner bark, or liber, meets in contact at all points: this done, it is covered with clay or grafting-paste, and bound up until amalgamation takes place.

268. A strong and efficient mode of grafting is represented on the next page. Make an elongated bevelled cut in the proposed stock from left to right; make another vertical wedge-shaped cut, three inches long, from left to right, leaving a narrow shoulder at the top on the left

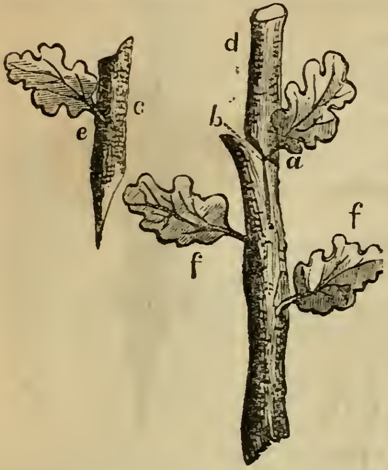
side, and terminating in the centre of the stock, so as to resemble that in the engraving. Take the intended graft, of the same diameter as the stock, and shape its lower extremity so as to fit into the cleft thus made, bind up in the usual manner, and cover the joint with grafting-paste. This forms a very strong and very useful graft in species which unite slowly.



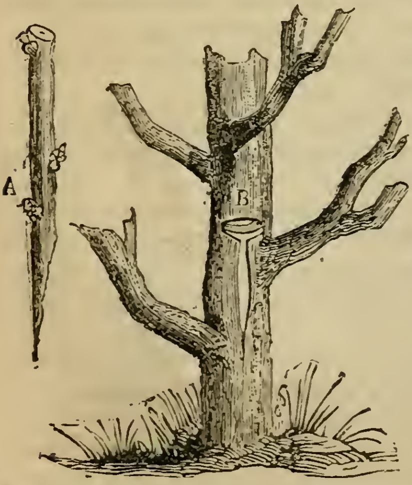
269. *Herbaceous-grafting*, as initiated by Baron de Tschudy, consists in choosing branches still in active growth. Pines, walnut-trees, oaks, and other trees which are multiplied with difficulty by other processes, are easily produced by this one. The mode of operating differs slightly, according to the species. In the case of pines and resinous trees, when the terminal bud of the subject, *a*, has attained two-thirds of its growth, make an horizontal cut at *d*; then make a slit downwards to the point where it begins to lose its herbaceous character in the ligneous consistence of the tree; stripping the part of its leaves, and leaving only a bud or two at the top to attract the sap. The graft, *b*, is now prepared, having a cluster of young buds at its summit, and its lower extremity shaped to fit into the slit, where it is so placed that the upper part projects over the cut in the stock. It is now covered with grafting-clay and bound, beginning at the top, below the bunch of leaves left on the stock, so as to avoid disturbing the leaves, and working downwards. This done, break off, an inch or so from their axils, the branches *c c* of the stock below the graft. When operating on delicate species, it may be desirable to envelop the graft in a covering of paper, to preserve it from the over dry atmosphere or the heat of the sun, for ten or twelve days after the operation. Five or six weeks after grafting, the union will be complete, and the bandage may be removed, or at least relaxed; and when the suture is perfect, the leaves at *d* may be removed, otherwise they will originate buds and branches from the old tree.

270. In other species proceed as follows:—Towards the end of May, when the terminal bud of the tree is in a state of active vegetation, make an incision, crossing the insertion of the petiole of the third, fourth, or fifth leaf, as at *b*, penetrating half the diameter of the stem; the choice of the particular leaf depends upon its state of vegetation as compared with the proposed scion. If the axil of the leaf, *a*, is examined, it will be observed that it has three eyes, or *gemmæ*, the centre one being most developed; it is between the axis

of the central eye, at *b*, and one of the lateral ones, that the oblique cut is to be made, stopping in the centre about half an inch below the axil of the leaf. The graft, *c*, consists of the fragment of a branch of the same diameter as the stock, and in the same state of vegetation; it is cut to the same length as the prolongation of the stem, *d*; it is wedge-shaped, fitted to the slit into which it is inserted, bound, and covered with some grafting-paste. The leaf, *a*, is left on the stock to draw the sap upwards for the nourishment of the graft. The leaf of the graft, *e*, assists in the process by absorbing it to the profit of the young scion. The fifth day after the operation, the central eye, *a*, is suppressed; five days later, cut the disk of the leaf at *f*, reserving only the median nervure, rubbing off at the same time the eyes at the axil of these leaves, repeating the same suppression ten days later. At this time, also, that is, twenty days after the operation, cut the disk of the terminal leaf, *a*: these several suppressions will force the sap progressively from the roots into the graft. Towards the thirtieth day the graft enters on its growth: at this time remove or relax the bandage, protecting it by a paper coronet from extreme drought and the sun.

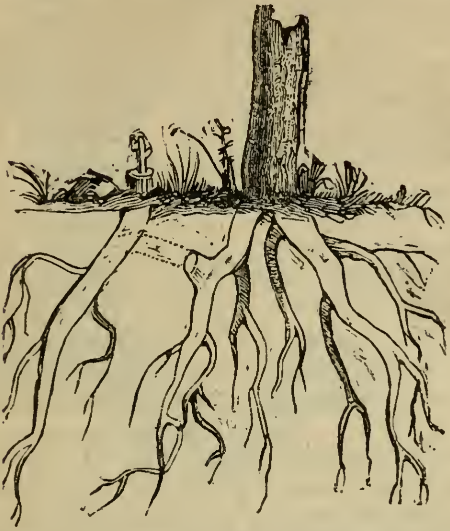


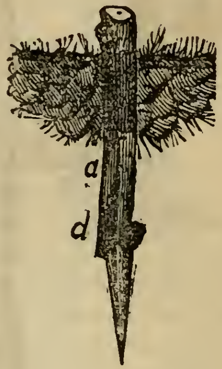
271. In *Side-grafting* it is not essential, as in other groups, to amputate the head of the stock, the graft being attached to the side, as its name indicates. Having made a cross-cut into the bark of a tree, as at B, and a vertical incision in the bark from its centre, thus marking a cut in the form of a T, each cut penetrating to the liber or inner bark; having also prepared the scion A by a longitudinal sloping cut of the same length, as B C, and raised the bark with the spatula of the grafting-knife, the graft is introduced, and the whole bandaged in the usual manner. This kind of graft is particularly useful in replacing branches on fruit-trees which are necessary to complete the symmetry of the tree for horizontal training.



272. In *Root-grafting* the roots are operated on as the stems have

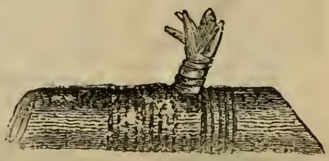
hitherto been, although it is by no means in common use, this mode of grafting is very convenient on some occasions. Having laid bare the roots to be operated on, shape the graft, *a*, by cutting its lower extremity into a shape resembling the mouthpiece of a flageolet, with a tooth or shoulder, *d*, in its upper part. Cut the root across as at the dotted lines, and make a vertical cut in the separated part to receive the tongue of the scion, with an opening also corresponding to the tooth in the scion. Bring the scion and vertical cut together, so that all the parts cut meet and cover each other, meeting just below the last bud on the scion. This root being already fixed in the soil, will serve to multiply plants which do not even belong to the same species.





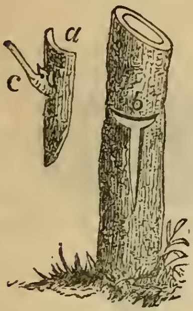
273. *Budding.*—Grafts of this description present the following characters: they consist in raising an eye or bud with a piece of the bark and wood, and transferring it to another part of the same plant, or any other plant of the same species. Budding is chiefly employed on young shoots or trees from one to five years old, and which bear a thin, tender, and smooth bark.

274. The necessary conditions are, that the operation takes place when trees are in full growth, when the bark of the subject can be easily detached from the *liber*, and it may be performed generally from May to August. The bud adapted for the operation should present well-constituted eyes or gemmæ at the axil of the leaf; if they are not sufficiently so, it is possible to prepare them by pinching the herbaceous extremity of the bud; thus producing a reflux of the sap



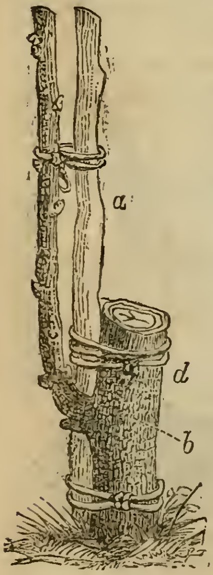
towards the base; and in about twelve days' time the eyes will have become sufficiently developed: then detach the bud from the parent tree. Suppress all leaves, only reserving a very small portion of the petiole, or leaf-stalk, *c*.

275. Having fixed upon the intended stock and bud, take a sharp budding-knife, and with a clean cut remove the bud from its branch, with about a quarter of an inch of the bark above and below; remove all the wood without disturbing the inner bark of the eye; for it is in this liber, or inner bark, that the vitality lies. Now make a cross-cut in the bark of the intended stock, and also a vertical one, T, and shape the upper part of the shield, or bud, *a*, so as to fit it exactly. Having fitted the parts correctly, raise the bark of the stock gently with the budding-knife, and insert the bud; afterwards bandage lightly above and below the eye, bringing the lips of the bark of the stock together again over the bud by means of the ligature, in such manner that no opening remains between them, and, above all, taking care that the base of the eye is in free contact with the bark of the stock.



276. Some weeks after, if the ligatures seem to be too tight, they may be untied and replaced with smaller pressure. When the operation takes place in May, the scion will develop itself as soon as the suture is completed. In order to provide for this, cut the head of the stock down to within an inch of the point of junction immediately after the operation.

277. When the operation takes place in August, the head is never cut till the following spring, when the scion begins to grow. If the same practice as in earlier budding were followed, the consequence would be, that it would develop itself before winter; but the bud, having no time to ripen its new wood, would perish, or at least suffer greatly. When the buds begin to grow, they require to be protected from strong winds; otherwise they would be detached from the stem. This is done by driving a stake, *a*, firmly into the ground, attaching it by a strong cord to the stem of the stock above and below the junction, as in the engraving, and tying the shoot of the young scion firmly to the stake above, protecting it by a bandage of hay or other substance, to prevent the bark being injured.



278. *Shield-grafting* is also usefully practised on the root in some cases even where the stock and scion are not of the same species. To discover the larger and best roots, trace them with the finger, and graft upon it in the spring, leaving the spot, *a*, occupied by the cushion uncovered. In the following spring, when the graft has

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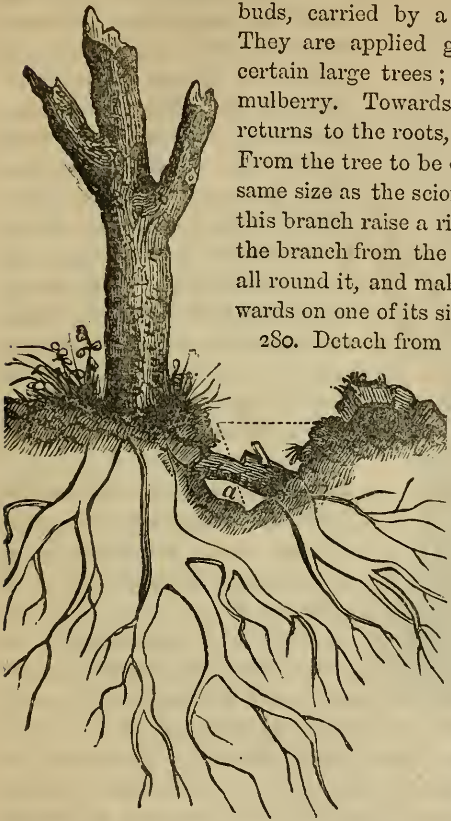
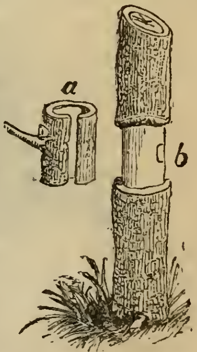
pushed forward, separate the root from the parent tree. We thus obtain a new individual.

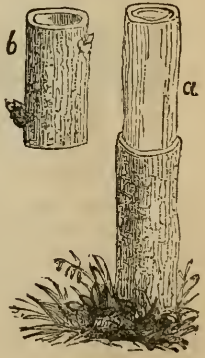
279. *Circle-grafting.*—These grafts are composed of one or many eyes or buds, carried by a ring of bark including the liber. They are applied generally to the multiplication of certain large trees; as the walnut, chestnut, oak, and mulberry. Towards the decline of autumn, as the sap returns to the roots, choose a mild day, free from rain. From the tree to be operated on, select a branch of the same size as the scion, having well-formed eyes. Upon this branch raise a ring of bark, *a*, without detaching the branch from the tree, making two circular incisions all round it, and making another vertical incision afterwards on one of its sides, and remove it gently.



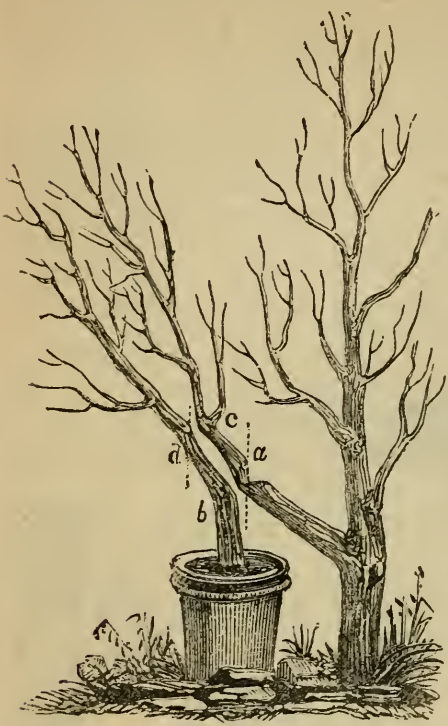
280. Detach from the intended stock another ring of bark of the same size, and place the ring of the graft in its place at *b*, and the ring of the stock on the place whence the scion was taken; bind up and cover the joinings with grafting-paste. In the following spring, if the graft has taken, cut the head of the stock immediately above the rings, which will favour the development of the buds which they carry.



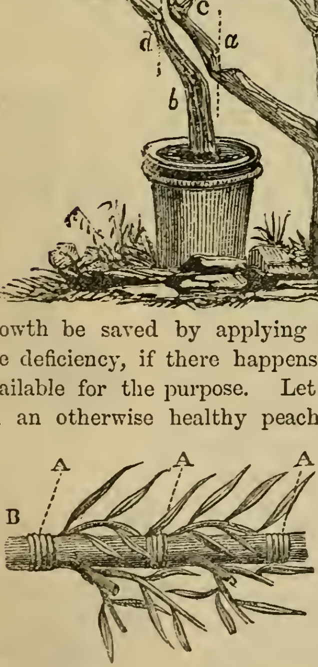
281. Another application of this mode is practised. When the spring sap is about to rise, cut the head from the tree to be operated on, and remove a ring *b* from the top *a*. Choose a tree of exactly the same size, on which the operation is to be performed; detach from it a ring furnished with two or three eyes, as *b*, and of the same length. Adjust this cylinder in the place of the ring detached, making it coincide exactly at its base with the old bark, and cover the whole with grafting-paste. Of all these grafts this is the most solid, and least subject to be disturbed by the wind; but even this requires protection, so that it is not shaken in its place till complete suture has taken place.



282. In *Approach-grafting,* supposing the stock to be planted, and the scion in a pot, as in the engraving, make a longitudinal cut in the stock, of such extent as to reach the medullary canal at *a,* and leave a corresponding notch in the scion at *b,* but in such a way, that in the scion it is less deep at the base, *b* ; while, on the contrary, the cut in the stock is less deep at the summit, *c.* Bring the two cuts in contact, so that the liber, or inner skin, of each meets the other; then bind them. The consequence of these unequal incisions will be, that in separating the head at the point *d* of the graft, and *a* in the stock, there will be less deformity left in the tree.



283. In the preceding examples of approach-grafting, the parts of the branch operated upon should be of the previous year's growth at least. It is sometimes desirable, however, to apply the principle to branches of the same year's growth. Accident may deprive a tree of the branches necessary to its symmetry, and a year's growth be saved by applying an herbaceous or green graft to supply the deficiency, if there happens to be a lower branch of the same tree available for the purpose. Let us suppose tha a void exists at AAA, on an otherwise healthy peach-tree, and that side branches, or fruiting spurs, are required at these points to balance the tree and restore its symmetry, and that a lower branch from B is available to supply them any time between June and August. Supposing the shoot to have attained sufficient length, an incision is made in the branch, about a quarter of an inch long, with a cross-cut at each extremity, deep enough to penetrate to the inner bark; the bark is raised from the wood on each side of the longitudinal cut by means of the spatula at the end of the budding-knife. A thin slice is now cut out of the shoot B, on the lower side, and opposite to a leaf-bud, corresponding in length with the incision on the branch. The parts thus laid bare are brought together, the lips of raised bark brought over the shoots and



the parts are again bound together. The process is continued as often as is deemed necessary, or the length of the shoots will permit, taking care that in each case a leaf-bud is left above the point of union, and that it is left uninjured by the ligature, but leaving eight or ten days between each operation.

284. In the following spring the union will be complete; but it is better not to separate the grafts till the second spring. At this time cut each shoot which has furnished the graft immediately below the ligature, and submit each of the new shoots to the usual training.

285. The weather most suitable for budding is a subject of dispute among practical men. Cloudy weather has generally been preferred; but Mr. Saul, of Bristol,—no mean authority, protests strongly in favour of warm sunny weather, provided the stock and buds are in proper condition. "In warm weather," he says, "the sap is more gelatinous, and the bud, on being extracted and inserted in the stock, quickly and properly tied, soon takes. On the contrary, in wet, cloudy weather, the sap is more thin and watery, and the bud will not unite so freely; besides this, a fall of rain, after the buds are inserted, likely enough, in such weather, will fill up the interstices and rot the buds before they have time to unite with the stock."

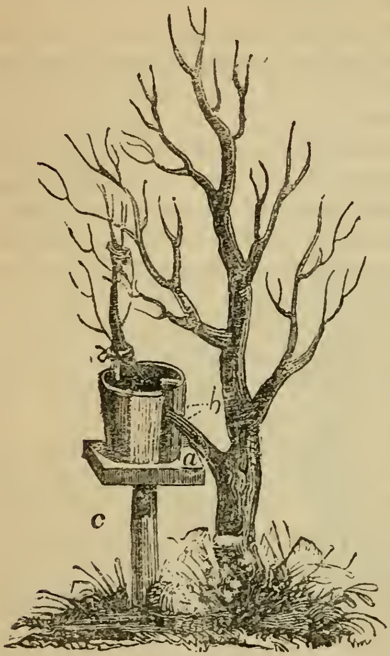
286. Another question Mr. Saul agitates:—Is it necessary to extract the wood from the eye of the bud? "American writers say, no; but I answer, yes," he says. "It may suit their hot, dry climate, but I must give the preference to our old system of extracting the wood from the bud, not only for roses, but for fruit, ornamental, and forest trees." In rose-budding, he adds, the bud in the shoot should be commenced with, cutting out from it about the eighth of an inch below the bud or eye, to about half an inch above it. Take out the wood without touching the liber or inner bark; next make an incision in the branch on which the bud is to be placed, quite close to the main stem, half an inch long, with a cross-cut at the upper extremity, thus T. Raise the bark with the end of the budding-knife, without bruising it, and insert the bud, tying it well with worsted thread, giving one turn below, and two, or at most three, above the eye of the bud. Worked in this way, they grow out from the axil of the branch, and look neat and workmanlike; and after a season or two, when headed back and healed over, it presents a fine bushy head, growing apparently out of the main stem, without scars, wounds, or knots.

287. The shoots selected for budding or grafting, whether for fruit or rose trees, should be firm and well-ripened: watery shoots, or watery buds, are valueless. For grafting, the branches should be of the preceding year, well ripened under an August sun,—Augusté, as French fruitists say.

288. The stock should be in a state of vegetation slightly in advance of the graft; otherwise the flow of the sap is insufficient to supply the wants of the scion. In order to provide for this, the graft may be removed from the parent branch a little before the operation, and buried under a north wall: there it remains stationary, while the stock is advancing to maturity.

289. It frequently happens that grafted fruit-trees, some at one period of

their age and some at another, cease to assimilate themselves with the stocks upon which they have been worked. This is to be seen by a thickening of the tree just about the place where it has been worked. This thickening, which in some parts of the country is called a burr, is always to be regarded as an effort of nature to throw out new roots and preserve life, and should be treated accordingly. If the tree has originally been worked, and the burr consequently shows itself at some distance above the ground, a large box should be provided, and placed round the burr, in such a way that it may contain a quantity of soil, into which the tree can strike out its new roots. This soil should be a light loam, and always kept moist. In the second or third year, new roots will have been formed, and the tree may safely be separated by a saw from the old stock, and let down into the earth beneath. When the tree has been worked close to the surface, a place about a yard square may easily be built up with bricks or tiles, and filled with light soil a few inches over the burr, to receive the new roots. In this way the writer has preserved two small trees of the Sturmer pippin, which he found fast dwindling away, the stocks on which they were worked not having power to sustain them. By a somewhat similar process, the healthy branch, *b*, of a favourite tree may be preserved by layering it in a box or pot, *a*, as in the engraving.

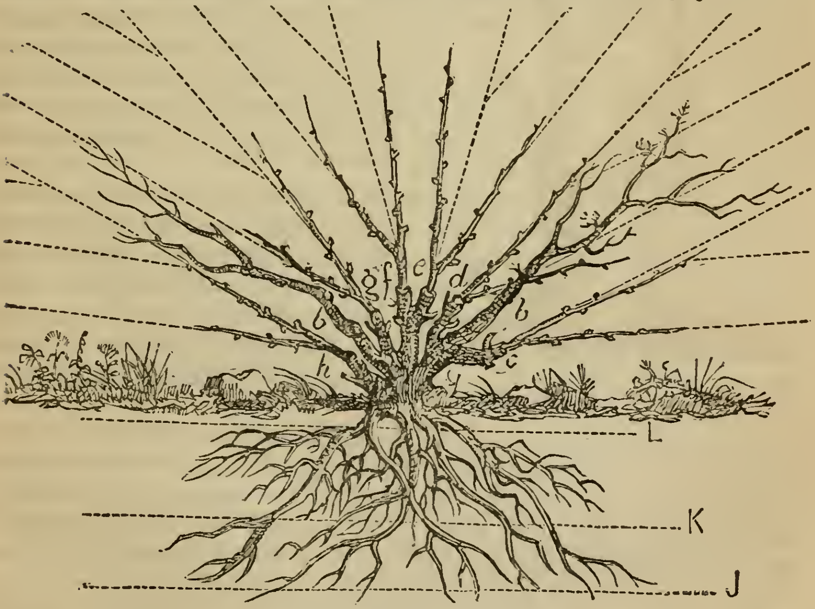


290. This is one mode of treatment which our correspondent D. furnishes us with; another, whose object is to utilize the roots and stem of the old tree, are also connected with the operations under consideration.

291. The final cause of the languishing state of these trees being the absence of vigorous young shoots and the imperfect organization of the cambium and liber, and, finally, the abortion of its root-fibres in consequence, the tree can only be restored to health by the production of more healthy and vigorous organs; and this may be done by concentrating the whole energy of the tree on certain points. This is done by amputating the principal branches, *a* (*see* the engraving at the head of this chapter), about seven or eight inches from their base at *c*, the branches *b* being left entire for the present, the amputations being so made that the branches left are not required to carry out the new system of training to be adopted, passing, in all cases, the four largest branches. These branches are retained for the present, it being yet

doubtful if the tree has strength to develop upon the old bark the new buds necessary to fulfil the functions of the roots; for if the buds perish, and there is no outlet for the rising sap, the tree dies. By preserving these branches, their leaves and shoots provide against such accidents. To facilitate the issue of buds on the tree, the hard dry bark should be removed by a plane, and its place covered by a coating of chalk and water, a covering which will stimulate the vital energy of the living bark, and protect the tree from the sun's rays.

292. Following this operation, we find that the sap concentrated on only a few branches acts with great energy upon the cellular tissues of the bark nearest to the summit of the cut branches. It determines towards these points the formation of buds, which soon develop vigorous branches. Towards the middle of June, choose such shoots as are best suited to form the principal branches for horizontal training; such would be *c d e f g h* in the accompanying engraving. The others are cut towards the middle of their length.



REGENERATED PEAR-TREE.

293. The year following, in the spring, train the principal branches according to the plan laid down; for example, in the fan shape, as in the engraving, break the tender branches close to their junction with the stem or main branch, and, during the summer, pinch the leading shoots off, so as to convert into fruit-spurs the shoots not intended to form main branches.

294. In the following spring the tree will be as represented above. At this time, the branches *b*, left for precaution, may be entirely suppressed, the

several cuts being covered with grafting-paste. These new suppressions increasing the energy of the young branches, they will henceforth grow with great vigour, and will soon replace the ancient tree.

295. In the same proportion in which the stem is operated upon, so must the roots be. As soon as buds begin to appear upon the portion of the branches left; the leaves which are developed send towards the roots a quantity of ligneous fibre and corticle, or wood fibre. In its course towards the roots, this sap meets with beds or layers of cambium and liber, through which they extend themselves in a languishing state, since it is now deprived of the fluid which facilitated its passage, taking their natural direction, and penetrating the cells in the bark upon the roots, they give place to new organs, at once more nourishing, more healthy, and more vigorous than the old roots. If, after three or four years, a tree operated upon as we have indicated is transplanted, it will be observed that the lower half of the old roots, comprised between the lines J and K, are decayed, and that young roots, comprising those between K and L, have been thrown out. The tree has reached the state represented in the engraving, and is supplied with young, healthy, and vigorous roots, as well as more vigorous branches, with new layers of cambium and liber. It is, in reality, a new tree, which has taken the place of the prematurely old one, whose organs have ceased to live.

296. Analogous treatment to that which we have indicated for espalier trees may be followed with standards and pyramid trees; removing the objectionable branches eight to ten inches from the stem, and placing a crown or cleft graft on each, if it is considered necessary, but taking care to leave a fourth of the old branches, till the branches cut down have thrown out young shoots. In the second year, the remaining branches may be removed altogether, the extremity of the severed cuts, when made perfectly smooth, being covered over with grafting-paste.

297. By these processes, it is possible, except in cases of complete decay, to restore the tree to its first vigour, especially in the case of pip fruit, as the apple and pear. In stone fruit, the success is less assured; above all, it is doubtful in the peach, which scarcely ever produces buds on the old wood; and the application of grafting is had recourse to when it is desired to regenerate the tree, or to graft an improved variety of the same fruit on an old but healthy stock. In this case, crown-grafting is adopted, and a graft placed at the extremity of each branch, which is cut down in the manner already described, favouring, in the meanwhile, the development of young wood at the base of the tree, by short pruning, and pinching off the buds at the summit.

298. We append to these details selections from a communication received from the intelligent correspondent already mentioned, which bear upon the subject under consideration. These communications will be distinguished by the signature D.

299. Cuttings in general may be considered as of two kinds,—matured wood and young green shoots. The former, whatever they may be, strike readily, and with very little care. An American plan, which is very successful, is to lay

them in slightly-damped moss, or to drop them lightly into a wide-mouthed bottle, having a piece of damp sponge at the bottom and a covering of muslin over the top. In either of these methods a callus is soon formed, and the cuttings readily throw out roots. Cuttings of young green shoots, however, require a very different treatment: they must be so managed as never to be allowed to flag, and the following appears to be the best method that can be pursued. Put silver-sand about an inch deep into shallow pans (common saucers answer every purpose), and in these plant the cuttings. Then pour carefully upon the sand enough water to make a thin sheet about it. The lower leaves of the cuttings are to be removed before planting, and the stalk fixed firmly into the sand before the water is poured on. These tender young green shoots, or cuttings, will be better for a little shade and heat. A piece of thin muslin or tissue-paper will provide the former, and heat may be had by placing the pan of cuttings over a basin of hot water, re-filled twice a day. These cuttings will be rooted and ready for potting off before the water in which they are grown has dried up.

300. GERANIUMS.—*To Strike Cuttings of Scarlet and other Geraniums.*—Cuttings of all sorts of geraniums for bedding the following year should be struck early: from the last week in July to the end of the first week in August is very good time. They should be taken in dry weather, when the parent plant has had no water for some days, and they should be kept to dry twenty-four hours after they have been prepared for potting. The more succulent sorts, and any that appear difficult to strike, may with advantage be touched at the end with a small paint-brush dipped in collodion, which will serve to hasten the callus which the cutting must form before it will throw out roots. They may be potted four or six in a pot, according to size. It is essential that the pots be well fitted with drainers, that the soil be light and sandy, and that it be pressed tight round the joint of the cuttings, which should be buried in it as flat as possible. When potted, they may be sunk in the ground on a south border, and well watered in the evening, when the sun is off. They will require no shading, except the sun be very scorching; and, in this case, they must not be kept from the light, but merely screened from the scorching rays of the sun. They may flag a little, but this is of no importance; in two or three days they will recover, and put forth roots. If they grow too freely before it is time to take them in for the winter, the top shoots should be broken off, and in this way they will make strong bushy plants.

301. *To Preserve the Old Plants of Scarlet Geraniums through the Winter.*—Take them out of the borders in autumn, before they have received any injury from frost, and let this be done on a dry day. Shake off all the earth from their roots, and suspend them, with their heads downwards, in a cellar or dark room, where they will be free from frost. The leaves and shoots will become yellow and sickly; but when potted about the end of May, and exposed to a gentle heat, they will recover and vegetate luxuriously. The old plants, stripped of their leaves, may also be packed closely in sand; and in this way, if kept free from frost, they will shoot out from the roots, and may be re-potted in the spring.

302. CALCEOLARIAS.—*To Strike the different Sorts of Budding yellow, and keep them through the winter.*—Take the cuttings early in October, and having prepared a piece of ground in a north border, the soil of which must be well drained, and made light with a large admixture of sand, place the cuttings in, and press the earth well round them, water them well, and cover with a hand-glass, or place the cuttings in pots, and having sunk them in a north border, under a wall, place a hand-glass over them. In this way they may be kept without further attention till the following spring, unless the weather should be very frosty, in which case it may be well to throw some covering over the hand-glass. In the spring the cuttings should be re-potted, and will soon become fine plants. It is to be observed that the state of atmospheric influence most favourable to all cuttings is when a change to moist growing weather succeeds, within two or three days, the warm dry weather during which the cuttings have been taken.

303. ROSES.—*To Strike Perpetual and other Roses, so as to produce dwarfs on their own roots.*—Any time from July to October take the matured wood of the current year's growth of perpetual and other roses, having four eyes just protruding; avoid, if possible, blossom-bearing shoots: plant these on a south border, burying two eyes in a sloping direction, from west to east, or, as the gardeners say, in graft. Be careful, also, to press the earth close round their roots, and occasionally look over them, as worms, &c., may loosen the soil. Cuttings are best left for two years, to become well rooted before they are removed to the flower-beds.

304. The following novel mode of striking rose-cuttings in autumn, which has been most successfully practised by M. Varangot, of Melun, is reported in the "Journal de la Société Impériale et Centrale d'Horticulture." It involves but little trouble, and is adapted to all sorts of perpetuals, and other hybrids with hard wood, which are usually considered troublesome to strike. In September or October, when the young wood is well ripened, take off the slips, and cut them, in the usual way, to two or three eyes, according to the distance which they are apart, taking care, at the same time, to retain a portion of the principal leaf-stalk, and some of the stalks of the first leaflets. Put them singly in small cutting-pots, or in pans, using plenty of drainers, and filling up with peat, or with a compost of sand and leaf-mould. Plant with a small dibber, pressing the soil firmly to the base of the cuttings; then water, and plunge the pots to half their depth in a bed sloping about six inches, and well exposed to the sun; and cover with a hand-glass. In a fortnight or three weeks the cuttings will have callussed and emitted some rootlets. They will not succeed well in the shade, or under evergreens, so late in the season. An old melon-bed is a good situation for them, as it does not afford too much moisture. Shading should be attended to for some time, if the autumn sun has much power. At the end of a fortnight, air must be given by raising the edge of the hand-glass on a small pot. When frost sets in, keep the glass perfectly close, and put dry leaves round as high as the top of the hand-glass. In April or May the pots will be found well filled with roots,

with care, even in varieties most difficult to strike. The young plants are now gradually exposed more and more to air and sun, till the hand-glass is wholly removed. The points of the young shoots should be removed and all flower-buds pinched off, that the plant may gain strength and throw out branches. In June, all those which have been struck in the same pan should be separated into single pots, and plunged again. They may require shading for a short time, till they begin to grow, but they will soon be well established and fit for planting out.

305. *To Preserve Cuttings from Frost where there is no Greenhouse.*—Dig a pit about four feet deep, strew the bottom well with ashes, and sink the pots in the same. Over it place a common garden-frame, bank up the outsides with straw and a coating of earth. In such a pit, verbenas, calceolarias, ageratums, fuchsias, &c. &c., may be preserved during the severest winters, provided the pots be kept in the dark by being well covered with matting during frost.

306. *To Select Stocks* (*ten weeks, German, &c.*), *so as to secure double flowers.*—Reject from the seed-bed all those plants which have a long tap-root (these will almost invariably prove single), and reserve for bedding only those which have the largest quantity of delicate fibres at the roots: experience shows that these, in general, prove double.

307. *Hardy Fuchsias.*—These make the best show when planted together in beds upon a lawn, the colours being judiciously blended. Those fuchsias which trail upon the ground should be grown with a wire hoop supported by three legs underneath them, so that their branches may be made to bend over the hoop. Several of the more hardy sorts may be trained on one stem, so as to appear as standards in the bed. A very large and beautiful variety of fuchsias is hardy, and will stand our winters in the open ground, especially in a well-drained light soil having a large portion of peat in it; and a great many that are looked upon as tender varieties will be preserved if covered three or four inches with dry cinder ashes at the first approach of frost. The best plan is to cover the whole fuchsia-bed at that time with a good coating. The dead branches should not be cut off, nor should the ashes be removed until the fuchsias begin to shoot in the spring.

308. *The Arum.*—This splendid plant, with its snow-white flower, its yellow tongue and arrow-shaped leaves, is not hardy with us; but it admits of an easy cultivation even where there is no greenhouse, and it is so ornamental in a room or hall, that it is well worth the little trouble which it requires. The arum grows freely from offsets, which are very freely produced. The plants should be repotted every October, in rich light mould, with a few drainers, the offsets having been carefully removed, and all the old soil well shaken from their roots. From this time till June, or earlier, if the plants have flowered and are over blooming, they should have abundance of water; but after this they must be kept quite dry, and may be put away in an outhouse till the following October, when the same treatment should be renewed. The arum, in a growing state, requires so much moisture that it is best to keep the pot always

standing in a deep saucer full of water. Under this culture, offsets may be brought into flower in their third year.

309. *Russian Violets.*—To have an abundance of fine flowers in the autumn and early spring, these should be planted in beds under a wall, in a warm aspect. The soil should be light, but very highly manured, with a large quantity of sand about four inches underneath the top soil. The roots should be planted in rows about 3 or 4 inches apart, and well watered. Every year, in April, immediately after they have done flowering, the buds should be broken up, the soil renewed, and fresh plants put in for another year.

310. *To grow Hyacinths in Moss.*—Fill a china bowl or other vessel with fresh green moss cleared of all impurities. Let this be well wetted, and lightly pressed down ; in it plant the hyacinth bulbs, covering them lightly with some of the greenest moss. As soon as the hyacinths are planted, place the bowl in a dark cool place for about three weeks afterwards ; keep it near a window, where the bulb will have plenty of light and air. Be careful that the moss is always kept damp, and that the top moss round the bulbs is changed frequently, in order that the surface may be kept green. The moss best suited to this purpose is that found on banks, or grown upon the roots of old trees.

311. *Deciduous Flowering Shrubs.*—Almost all these, which are very ornamental, are easy of cultivation ; but they require an amount of care and observation, in order that they may be made to produce abundant and handsome flowers. Lilacs and laburnums may, with advantage, occasionally be thinned out, but they ought never to have their shoots shortened ; while Guelder roses, syringas, ribes, spiræas, and others, will be benefitted by almost any degree of pruning, and can only be made to bear fine handsome flowers by having their spring shoots well cut in about the end of May and beginning of June.

312. *To grow plants that have a tendency to stray.*—To preserve a neat appearance in the flower-borders, all perennials that have a tendency to run about or stray,—and there are many of which this is the habit, should have their roots confined under the surface with tiles. Old chimney and seakale-pots are very good for this purpose. By this means they may be kept within due bounds, but, of necessity, will require every few years to be transplanted into fresh soil.

313. Plants that have been frosted should never be touched with the hand, or moved ; even if in pots, it is best to let them remain where they are, and to place a hand-glass or frame over them, to keep them from further injury, shading them at the same time. As soon as the thaw comes, they should be well watered from a fine rose—they can hardly have too much water. After this they must be left for some days before they can be removed with safety.

314. *Strawberry-beds.*—The proper time to make new strawberry-beds is the month of August ; but if space of ground cannot then be had, or the time spared, it is an excellent plan to take the runners at that time, and set them only a few inches apart in peat-soil, on a north border, where they will soon

make good root, and become strong plants. In the early spring they should be taken up separate, with a ball of earth, by means of a trowel, and planted a proper distance from each other in the bed intended for them.

315. An American writer, Hiram W. Buckley, New York, gives the following novel method for forming new strawberry-beds :—"Whenever I wish to make a new strawberry-bed, I allow the old bed to run into mass. Then, at any time during the autumn or early spring, I line strips about 7 inches wide and 20 inches apart through the length of it, and cut them into squares. These squares I take up with a spade, about 3 inches deep, and set them 18 inches apart in furrows previously made 2 feet apart in a new bed. As the roots are not disturbed, they bear a full crop the first season, and this pays well for the heavy labour of removing so much earth. I make no account of the large number of roots required, since they spread so rapidly as to cover the ground in a single season, even when runners are kept back till after fruiting. The trenches made in the old bed are filled with rich earth and manure, and the bed is soon covered with plants again, when other trenches may be made and filled; thus renewing the whole bed by degrees, as occasion requires." It is of so recent a date that his plan cannot have been tested in this country. It seems, however, very likely to answer, and to be a saving of time in the formation of new beds. Still it must be remembered that when fine fruit is required, the plants should be kept single—quantity undoubtedly is gained by allowing the beds to run into mass.

316. *To propagate Mistletoe.*—To many persons the cultivation of the mistletoe is looked upon with as much doubt as we are told the ancient Romans looked upon the cultivation of mushrooms. It may, however, be very readily cultivated by attending to the following directions :—Make an incision in the bark of an apple-tree (many other trees, as the pear, oak, whitethorn, and even laurels, will answer equally well), and into this incision, in the spring of the year, insert some well-ripened berries of the mistletoe, carefully tying the bark over with a piece of bass, mat, or woollen yarn. This experiment often fails, from the birds running away with the berries from the place where they have been inserted, for they are very fond of them. To prevent this, the incision in the bark should be made on the underside of a hanging branch, where birds are not likely to rest.

317. *Useful Hint in Transplanting.*—In transplanting any tree or shrub, especially evergreens, be careful to preserve the same aspect; that is, keep the same sides to the north, south, east, and west, as before. This will greatly facilitate the speedy establishment of the plant in its new situation.

D.

CHAPTER XI.

PESTS OF THE GARDEN.

318. Independent of its practical value to the gardener, the study of Entomology has its own pleasures, derivable from observing the minute and curious creatures whose habits it is its object to illustrate. The study of these habits, which so much affect the object of the gardener's care, forces itself upon him, and he has only the choice of studying them

in a systematic and efficient manner, by which he will have his knowledge always available, as in a carefully labelled store-house; or in an erratic rule-of-thumb manner, where he will have to look up his knowledge when it is most required, and feel himself involved in a maze of doubt when any new phenomenon presents itself for the first time.

319. As all insects are produced from eggs, and as the maternal instincts enable the mother to place the eggs in a spot where they will not only be safe, but where the young grub will find food to support itself until its first transformation takes place, a knowledge of the habits of the more destructive species is absolutely necessary to the gardener; the most effective remedy being to destroy the egg; for the caterpillar or larva state is that most destructive to vegetation. In this state the name of caterpillar is applicable to Lepidopterous insects or moths, and butterflies, and some of the Hymenoptera, or bees. Grubs are the larvæ of beetles, generally with three pair of feet, strong jaws, and fat mis-shapen bodies; maggots are the larvæ of flies, moving along the ground by the muscular action of the rings of the body; the larvæ of bees and ants being also generally called maggots.

320. When the larvæ of these several creatures have exhausted the food near which the provident care of the mother has placed them, they are generally prepared for their second transformation,—the pupa or chrysalis state: winding themselves in their cocoons, they bury themselves in the earth, or in some other obscure place, and emerge in a few hours in forms as various as were their larvæ, the beetles with rudimentary feet, which are developed in their perfect state; the butterfly naked, suspended by the tail, or attached to the branch of some tree or wall; the moths enveloped in a bag or cocoon, which they have spun round themselves, as in a shroud; the flies and two-winged insects, smooth oval substances, are fixed to the plants or trees which have supported the larvæ. At length their last metamorphosis occurs: the caterpillar becomes a moth or butterfly, gaily painted in its garb of summer; the grub becomes a beetle, with its diaphonous-coloured, hard, shining shell; the maggots develop themselves in thousands of shapes, floating and humming in the air,—the two-winged insects, or diptera.

321. All the mischief, however, has been done, so far as the garden is concerned, and the gardener has only to look forward, as he ever must, to the next season. The insect life humming and buzzing around him is shortlived: one object of their creation has been attained; they have performed, so far, their office of scavengers; their next is, to perpetuate their species; and the object of the gardener must be to circumvent them there, by destroying their eggs as they are deposited.

322. *Rose Insects.*—There is no class of flowers so much exposed to the depredations of insects as the rose, and no remedy can be applied to their depredations without a precise knowledge of their habits and different states of transition. St. Pierre, when he had studied the economy of the different insects which infest the rosetree for thirty years, still found something new to note. Moths, beetles. and gall-flies, and other insects hardly known

to the initiated, seem to unite their forces in order to attack the queen of flowers. During June and July, the rose-beetle (*Cetonia aurata*) may be seen wheeling round the rosetree, with its low hum, its wing-cases and elytra erect, instead of being extended from the body. It feeds upon pollen and honey, and in doing so bites off the anthers of the flowers, while its larvæ feed upon decaying wood and vegetable matter, burying themselves in the ground, like the cockchafer.

323. Among the moths, the bell-moth (*Argyrotoza Bergmanniana*) is distinguished by the rich golden yellow of its breast and fore-wings, slightly clouded with orange, and bars of purple-brown with silvery scales. This moth, in the caterpillar state, is very destructive round London to roses. The moths deposit their eggs in the summer in the incipient buds, and they commence their operations on the leaves as soon as they appear, attaching them back to back by their silk-like thread-fibres. Round these leaves others grow in distorted shape, while the caterpillar revels on its core, "a worm i' the bud," devouring the petals of the flower as well as the leaf. When disturbed, the caterpillar drops down, suspended, however, by a thin web which it spins, by which it is able, when the danger disappears, to resume its former position. The only method of destroying these insects is by sharply pinching the buds where they are suspected to be in the early spring: this will relieve the plant, and enable it to throw out fresh leaves. If allowed to arrive at maturity, the moths should be destroyed as soon as they appear, and before they can deposit their eggs. The ashy-white bell-moth (*Spilonota aquana*) is another moth of the *Totricidæ*, which has been reared from the leaves of the rose, and of habits similar to the preceding, with similar remedies. The yellow-tail moth, which has usually been found on the oak, the elm, and the blackthorn, Mr. Westwood has also found on the Scotch rose in his garden, feeding upon the petals, and afterwards attacking the leaves. This moth appears at the end of July, and the caterpillar (which is thickly clothed with long black hairs) feeds also on the pear.

324. The Gall-flies (*Cynipidæ*) produce the large woolly galls upon various kinds of roses. The larvæ of *Rhodites Rosæ* are white fleshy grubs, destitute of feet, which are transformed into white inactive pupæ at their full size: they undergo their change to the perfect

BEDEGUAR, OR RAGGED ROBIN.

state within the gall, or *bedeguar,* as it is called, eating their way through it to the open air, and emerging in their winged state. Several species of these gall-flies are found together; as *Aylax Brandtii,* and some others. No production of nature seems to have puzzled the old naturalists more than the galls produced by these creatures. Some ascribed their origin to spontaneous generation; others, finding eggs and larvæ in the middle of a substance without external orifice, inferred that they had been deposited in the earth, and drawn up with the sap through the vessels of the plant to a certain height, where they stopped, and, being now hatched, produced gall-nuts; others, like Redi, ascribed the origin of the larvæ found in the bedeguar, and other gall products, to the same source as the fruits and flowers.

325. Among the saw-flies, so called from the females possessing a saw-like apparatus at the extremity of the body, *Cladius difformis* measures a sixth of an inch in length, black and shining in body, with dirty yellowish-white legs. It feeds upon the leaves of various kinds of roses; the caterpillars are found feeding on them in the beginning of July, remaining in the pupa state a fortnight or three weeks, when they appear as perfect insects.

326. The little weevil (*Balaninus Brassicæ*) is also fond of the petals of the rose, riddling them through with small holes. While these two species feed on the petals, the little beetle *eligethes Æneas*) attacks it for the sake of the pollen, and the leaf-cutter bee uses its delicate leaf to line the cells of which its nest is composed. The brilliant little moth *Microsetia antefolulla,* which does not measure more than the sixth of an inch in the expansion of its fore wings, deposits its eggs within the substance of the leaves, from which the full-grown grub eats its way through the dried surface, and crawls down the stem until it reaches a place of safety, where it can form its cocoon.

327. The *pear-tree* is likewise subject to the attacks of several species of Lepidoptera, Saw-flies, and Aphides. Among the Lepidoptera, the beautiful moth *Zeuzera pyrena,* with its antennæ feathered on each side, is furnished with an elongated telescope-like ovipositor, with which the female deposits the eggs to a considerable depth in the crevices of the bark of the tree. The perfect insect appears in July, and the caterpillars in August, when they immediately burrow into the wood of the tree. In September they moult, and in the following June they are full grown. Sparrows are the gardener's best ally in destroying this insect in the perfect state. Several other small Lepidoptera are injurious to the pear; *Argyromyges scitella,* one of the Tineidæ, deposits her eggs on the under surface of the leaves towards the end of May. The young larvæ penetrate the under cuticle, and feed on the fleshy parenchyma, leaving the surfaces untouched, giving the leaf a flabby and blistered appearance. The Chaumontelle is said to be particularly subject to the ravages of this creature. In the beginning of autumn the leaves appear to be most affected.

328. Another species, *Pædisca angustiorana,* though more commonly found on apricot-trees, has also been found on the pear and other trees; it is distinguished by a fine delicate web, which it spins round the stamens and

withered calyx within which the caterpillar is found. In this case the remedy is to search for the pupæ in the eyes of the bud wherever any of the web is observed. Picking off the leaves is recommended before the larvæ have left them, or pinching the blistered part sharply with the finger and thumb. Fallen leaves should also be collected and removed at the close of autumn; this is also serviceable in preventing the propagation of the species in the following spring.

329. Aphides, or plant-lice, and their congeners, are indicated by an unhealthy appearance; the leaves and young shoots curl up, and multitudes of ants, who seem to feed on their secretions, are seen about the tree. The remedy is repeatedly syringing the leaves and stems with tobacco- or lime-water, or with gas-tar water when that can be obtained; but the plants should be carefully examined in May, and the winged parent of the *Psilla Pyra,* and its congeners, destroyed before they have deposited their eggs. Lady-birds (*Coccinelidæ*) render great service in destroying myriads of aphides, which ought to insure them the protection of gardeners.

330. *Green Fly.*—Fumigate with tobacco the plant infected, and syringe it well afterwards with clean water, or, if it is not possible to fumigate, wash the plant with strong tobacco-water, by means of a soft brush.

331. *Gooseberry Caterpillars.*—These pests, of late years, have become exceedingly prevalent, and in different parts of the country the gooseberry has been nearly destroyed by them. They come principally from a saw-fly, which lays its eggs in rows along the under-ribs of the leaves, and after having committed its ravage, falls to the ground, where it lives in the pupa state till the following season. The bushes should be carefully looked over once a week to watch the hatching of the eggs, when the infected leaves may be picked off. To prevent the fly from settling, the bushes should be dusted over with hellebore powder, or watered with a strong decoction of the digitalis, or common foxglove. If the caterpillar has begun its ravages, the ground beneath the bush should be sprinkled with new lime, and a double-barrelled gun fired two or three times under it to shake the caterpillars down into it. The most effectual preventive, however, is to remove the top soil from under the bush during the winter time, and destroy the grubs in it by mixing it with salt or soot; the parings so mixed may be buried or entirely removed, and new soil placed round the roots instead of it. Layers of bark from the tan-yard, when used as a covering of the soil underneath the bushes, have been found very useful in destroying the insect in its chrysalis state. One of our very best practical gardeners, Mr. Ogle, at Erridge Castle, Kent, says, "In the autumn or winter, when digging between the bushes, sow the whole ground over with *fresh-slaked* lime, using a liberal supply of lime more particularly round the stems and about the roots of the bushes, forking the ground over. About the middle or latter end of March repeat the application, more especially round the roots, and rake the ground in, repeating it again in two or three weeks. Few caterpillars will survive this treatment." No object in the garden is more exposed than the gooseberry to insect depredation,—caterpillars, aphides, as the small green

insects developed in myriads in a single morning on some hitherto healthy bush, are called, and saw-flies ; the gardener who would guard against these enemies must examine the under-sides of the leaves of his bushes every morning in the season, wash them with lime-water wherever he sees signs of their eggs, applying it either forcibly with the syringe, or hand-washing with a sponge.

332. No class of insects give more annoyance in the garden than Wasps ; the sweetest and ripest of the wall-fruit become their prey, unless precautions are taken to prevent it. Towards the end of autumn, that is in September and October, every specimen of the common wasp should be sought for and destroyed ; those individuals still left being females in search of a quiet corner in which to deposit their eggs and pass the winter, each of these, if left undisturbed, is destined to become the foundress of a fresh nest. One of the best traps for catching wasps is formed by placing a couple of hand-lights on the top of each other, making a small hole at the apex of the lower one, attracting them into it by placing ripe half-eaten fruit beneath the under one. Another mode of dealing with wasps is as follows :—Having found the nest, rinse well with spirits of turpentine a common wine-bottle, and while the inside of the bottle is wet, thrust the neck of it into the chief hole of the nest, carefully stopping up all other holes with clods of moist earth, to prevent the egress of the wasps. This, of course, is best and most effectually done in the evening. The fumes of the turpentine will first stupefy, and then destroy the wasps : in a few days the nest may be dug up. All persons interested in gardens should be careful to destroy the large female wasps which may be seen about singly late in autumn, and on fine days in the early spring ; these, as we have already stated, are looking out for a wintering-place for their eggs.

WASP AND NEST.

333. *To destroy Ants.*—Place an inverted garden-pot over the nest, and the ants will work into it. Remove the pot in a day or two, by placing a spade underneath it ; then plunge it, with its contents, into boiling water, and repeat the process if necessary. Ants may be expelled from any particular plant by sprinkling it well with sulphur : they may also be kept away from wall-fruit and other fruit while ripening, by drawing a broad band with chalk,, along the wall near the ground, and round the stem of the trees.

334. *Earwigs.*—Place pieces, about four or six inches long, of the hollow stems of any plant, in an horizontal position, in different parts of the trees on

which earwigs abound. The earwigs will congregate in these, and may be shaken out into boiling water and destroyed. Very small garden-pots containing a little dry moss may be inverted on the top of a stick, and in this way will form a good trap when placed among flowering plants.

335. *To destroy Slugs.*—Of slugs there are several varieties, but the most destructive in gardens are the small white and small black slugs, which bury themselves in the ground or under leaves, and come out in the night-time to feed. To destroy these, take fresh lime in a powdered state, put it into a coarse bag, and after night-fall or before sunrise, dust the ground where slugs are about: every slug touched with the smallest particle of the lime will die at once. If the weather be wet, the power of the lime will soon be destroyed; but if the ground be strewed in the evening with fresh cabbage-leaves, the slugs will hide under these, and may be destroyed in the morning.

336. *To prevent Snails crawling up walls, trees, &c.*—Make a thick paste with hair-oil and soot, and daub the bottom of the wall with it: this will form an effectual barrier, over which no snails will attempt to pass.

337. *Mice.*—There appear to be three sorts of mice, all doing more or less injury to gardens,—the common house mouse, and two descriptions of field mice, the short- and long-tailed. They are all very destructive to newly-sown peas and beans, also to crocuses and other bulbs. To preserve peas and beans from injury by mice, let them be well saturated with a solution of bitter aloes before they are sown, or, having soaked them in salad-oil, let them be rolled in powdered resin, which will answer the same purpose. Chopped furze, also, may with great advantage be placed in the drills over the seed. The most effectual remedies, however, are poison and micetraps: of the latter, that usually termed the figure-of-four trap, formed with three pieces of stick and a tile, is perhaps the most simple and efficacious.

338. *Moles.*—These troublesome intruders may be driven out of the garden by placing the green leaves of the common elder in their subterranean paths, for the smell of these is so offensive to them, that they will not come near it; or they may be poisoned by placing in their paths worms, which, for some time, have been left in a place with a small quantity of carbonate of barytes.

339. *Weeds and Moss on gravel walks and in paved yards.*—Sprinkle the walks and yards over with refuse salt, but be careful to keep the salt from box-edging on the sides of the grass. This should be done in dewy or damp weather, but not during rain.

340. Fleming's machine may be described as a large wrought-iron boiler, fitted upon wheels, with a fireplace in the centre, for the purpose of heating water to a boiling temperature. Connected with the boiler is a spring valve and delivery-pipe, similar to those used in the common watering-carts, through which boiling salt-water is delivered in a continuous and gentle shower, the salt being mixed in the proportion of two pounds of salt to a gallon of water. The same apparatus, in a more portable form, might, of course, be attached to any wheelbarrow. At Trentham this contrivance is found to be very

effective, and much more economical than hand-weeding the paths, besides giving a freshness, and even brilliancy to the gravel.

341. *To kill Docks and Dandelions, &c. &c. on Lawns.*—Cut the tops off in the spring, and place a pinch of salt, or a little gas-tar, on the fresh wound.

342. *To clear a Lawn of Daisies.*—For this purpose there is nothing equal to the continued use of the daisy-hoe: with this ingenious little tool several square yards of apparently the most hopeless grass can be cleared in a few days. The hoe should be used in moist weather, and the grass well rolled afterwards.

343. *Gumming in Fruit-trees.*—Scrape the gum clear away, and wash well the place where it has accumulated, and stop it with a compost of horse-dung, clay, and tar.

344. *To prevent Cattle from barking Trees.*—Make a strong paste, of two parts cow-dung and one part lime, with a little water: lay this, with a brush, thick on the stems of the trees, as far as the cattle can reach: a good wash, to prevent injury from hares and rabbits, may be made with one half cow-dung, one quarter coal-tar, and one quarter lime, and applied in the same way.

345. *To get rid of Moss on Fruit-trees.*—Wash the branches of the trees wherever moss appears, with strong lime-water: strong brine will also answer the same purpose.

346. *Moss on Lawns.*—All remedies are useless until the lawn is well drained; when this is done, rake the grass with a sharp-toothed rake in different directions to drag out the moss, and roll with a very heavy roller in wet weather. Nitrate of soda, at the rate of 1½ to 2 cwt. per acre, should be sown in the spring, over the mossy grass. Very fine coal-ashes, also, may with great benefit be spread over those parts of the lawn where moss abounds, especially if done in wet weather, or before a soaking rain.

347. *Mildew.*—Syringe the plant upon which the mildew has begun to make its appearance, with a strong decoction of green leaves of the elder; or use in the same way a solution of nitre, made in the proportion of 1 oz. of nitre to one gallon of water. A mixture of soap-suds and sulphur will, in many cases, answer the same purpose.

348. *An excellent Dressing to destroy the Eggs &c. of Insects that infest the bark of trees and old walls.*—Take ½ lb. of tobacco, ½ lb. of sulphur, ¼ peck of lime; stir these ingredients well together in three or four gallons of water; leave them to settle, and syringe the trees and walls well with the clear liquid. More water may be added when the first is used up.

349. *To destroy Worms in Lawns.*—Take newly-slaked lime, in the proportion of 10 lbs. of lime to about 30 gallons of water. Stir it often, and then let it stand to settle. Draw off this water clear from the sediment, and with a rose watering-pot spread it freely over the lawn. The worms will come to the surface, and may be swept up with a broom. This operation is most effectual if performed in damp weather, as the worms then lie nearer the surface. It may be repeated till the worms disappear.

350. *Wireworm.*—If any bed or favourite plant suffers much from wireworm,

a good trap may be made by placing small potatoes with a hole in them just under the surface of the ground, at different intervals. The wireworms will, in general, prefer this to any other food, and a daily examination will serve to entrap a great many of them.

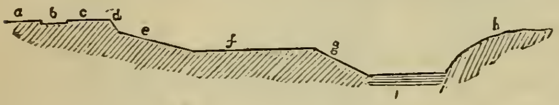
351. *Clubbing in Broccoli.*—This disease, so destructive to a crop of broccoli, especially on poor land and under indifferent culture, may be prevented, in some degree, by dipping the roots, before planting, in a thick mixture, composed of ¼ peck of soot and 1 lb. of saltpetre, with water added to make it the consistency of paste. A more certain remedy, however, is found in a proper system of cropping and manuring, by which this exhausting vegetable is made to follow, in rotation, crops which act as deepeners and restorers of the qualities withdrawn by previous crops of Brassicæ.

CHAPTER XII.

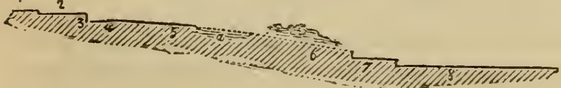
LEVELLLING AND LAYING OUT.

352. HAVING selected, inclosed, drained, and mapped out the site for house and garden, determined upon the lines of roads and principal walks, and decided upon the leading features of the place, the next step is to operate upon the ground itself; and in this, if in anything, it is imperative that correct theory, or a clear perception of what is to be done, and how and why we do it, should precede all practice, in order to avoid alterations during the progress of ground-work, which are vexatious to the operator and ruinously

expensive to the proprietor. Perhaps there is no better mode of preventing such evils than by the formation of a model of the centre garden, on a small scale, in a box of sand, or on a large scale on a piece of ground. Not only the outlines of walks, forms of beds, positions of vases, fountains, &c., but every irregularity of surface, depth and inclination of terraces, and even the effects of planting, can be thus vividly illustrated. Having discovered by this, or any other method, what your garden is to be, the next point demanding attention will be the form of the surface and character of the soil. It is seldom that either will be found exactly adapted to our tastes or necessities; the former will generally require improving in form, and the latter in quality. Smoothness or evenness of surface is not only one of the elements of beauty, but constitutes the chief charm of every garden; not that the surface need be level; but the fall should be regular, the elevations nicely rounded off, and all small irregularities removed. The best form is to have the ground level for twenty or fifty yards round the house, and then a gentle incline beyond it. Occasionally, however, grounds will look very charming if they have a gradual rise at a distance of 100 to 200 yards from a dwelling-house. One of the most beautiful gardens I have ever seen was shaped thus, *a* being the house, *b*, a gravel walk, with grass-plot, *c*; beyond, a sloping bank, *d*, terminating in a sloping lawn, *e*; at the base is the flower-garden, *f*, and a sloping bank, *g*, down to the water, which may either be an artificial canal or a natural river, the opposite bank, *h*, being a wood or copse of shrubs. If the opposite bank had been nicely sloped down to the water, and planted with rhododendrons, these grounds would have been still more perfect. When I saw them, the wood-side was exceedingly rough, and an irregular run of jagged edges of earth exhibited along the water's edge throughout its entire length. The banks of all ornamental water in dressed pleasure-grounds, whether composed of turf or stone, should descend several inches below the water-line.

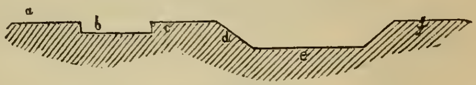


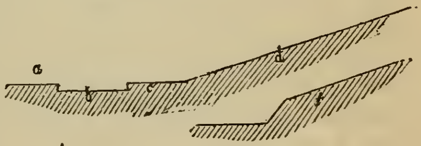
353. At one of the finest places in the county of Norfolk, if not in the kingdom, the house stands on the side of a hill, sloping down to a most extensive, rich, agricultural, wooded valley beyond. It is surrounded with wide terraces, supported with massive walls finished with rich balustrades, the different levels being reached by magnificent flights of steps. The following exhibits a rough section of the shape of the ground about the centre:—1 is the position of the house; 2, the grand terrace, of different widths and levels, edged with scroll-work of box and white sand, filled up with deep bedding-plants; 3 is the massive stone wall; 4, a border for geraniums, with patches of hollyhocks, &c.; 5, sloping lawn, furnished in some parts with fine large trees, in others with regular-shaped beds for bedding-out plants. The dotted



lines indicate a gravel walk, which skirts along part of the wood, that occupies, in one part, the second slope ; at other points this slope is furnished with blocks of trees, &c., and planted as a fernery, or wild natural scenery for a ribbon-border of dahlias, perhaps 200 yards long ; 7 is a broad turf promenade, probably 1,500 yards long and 30 feet wide, which bounds one side of the nearly level space ; 8, which is occupied with a succession of gardens in almost every variety of style, from the richest embroidered patterns of box, sand, and flowers, through a succession of beautifully-grouped flower-gardens, down to the most perfect imitations of natural scenery, indicates the position of a walk which winds through beds of flowers, groups of shrubs, &c., laid out in the picturesque style ; and the whole is bounded, on that side, by a belt of wood, and at each end by an extensive park.

354. Doubtless such positions are the most commanding, and afford great scope for the display of cultivated taste and inventive genius ; sometimes, however, the grounds are level, and it is desirable that a distant view should not be obscured by a garden on the surface ; in such cases the ground is shaped as follows ; *a* being the house, *b* the gravel walk, *c* the turf lawn, *d* a sloping bank, *e* the garden, with rising bank beyond. Occasionally, again, the ground rises from the house, and a garden has to be looked up to, as in A ; in all such cases the ground should be levelled as far as *c*, and then either rise gradually, as shown above, or suddenly, as in B. When a garden is formed on the rising slope, the former method is generally best, as the beds meet the eye better. In one new place that I laid out, the ground rose rapidly towards the east, and was level on the south front. Now, as this commanded a magnificent view, it was determined to keep that perfectly clear, and the garden, *b*, was formed to the left of the house, thus :—





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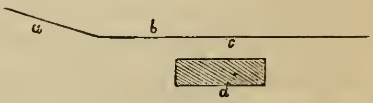
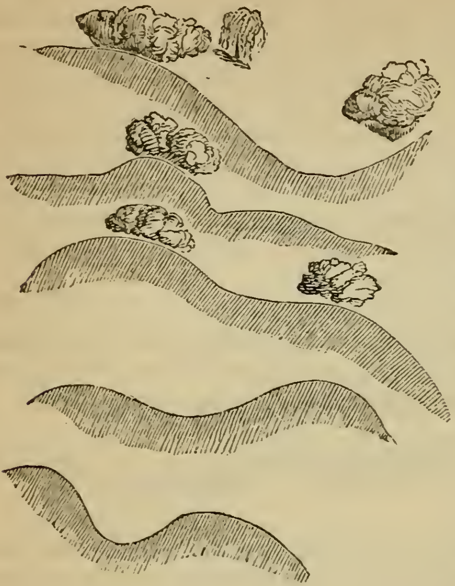
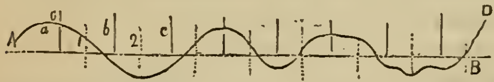


355. Brick or stone walls will sometimes be better and more effective than earth-banks for maintaining the different levels ; they should incline towards the bank from 1 to 1½ inch, according to their height. Generally, it will be best to finish them with balustrading and vases ; occasionally, however, the wall will look best if rendered altogether invisible from the inside, with a plain wall or walls on the outside,—a kind of ha-ha. In all cases where walls are used, the different levels must be connected by flights of stone steps. The tread of these may range from 15 inches to 2 feet, and the rise should average 6 inches in depth. Turf steps should never occur on a gravel walk, nor stone on a turf bank.

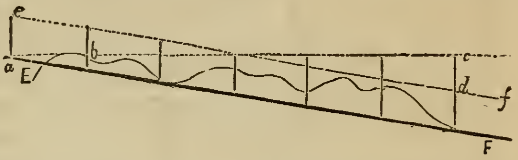
356. But it is not possible, if it were desirable, to lay out all gardens either upon level ground or such as has a regular slope. Sometimes the intervention of rocks, the enormous quantity of material to be moved, and even the style adopted, may render this absolutely impossible or not desirable. As a rule, all geometrical gardens look best, and appear largest, on level surfaces; such a surface is also most effective for displaying the gardenesque style. In the picturesque, irregularities of surface may not only be useful but highly desirable. These sketches, which are sections of country, will illustrate my meaning. It is obvious, that if trees, shrubs, &c., are planted on these knolls, they will appear much larger, and more effective, than if placed on a level surface.

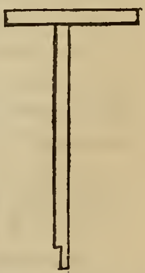


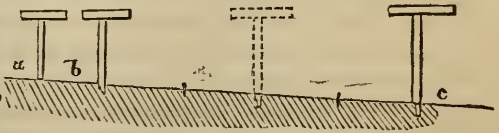
357. Having glanced at some of the many varieties of surface-forms that may occur in laying out a garden, I will now proceed to give a few hints concerning their production. Nothing can well be more simple than making ground level; all that is necessary are a few stakes of varied length, a mallet, a common angle or spirit-level, and a straight-edged piece of wood, 1½ inch thick, 4 deep, and 10 or 12 feet long, or, better still, the base of the level might be so long. Suppose, then, the waving lines in the following section to represent the natural, and the dotted line the desired level. Drive in a stake level with the surface at A, insert another at B; place the level across the top, proceed then from *b* to *c*, and so on throughout the entire length: this operation will produce the level line of stakes CD. Then, having determined on the level to be adopted at A, measure the same distance down from the top of each stake on the line CD, and this must obviously furnish the required level, AB. In this section there will be rather more earth to be moved than will be required to fill up the depressions on the surface. Sometimes this is an advantage, as the earth may be wanted elsewhere; but if it is otherwise, an excess of soil must be guarded against by a careful survey and correct measurement of the surface. Where this is the case, one of the simplest methods for arriving at a correct estimate is to dig out narrow lines across the ground to be levelled, at distances of 20 or 30 feet apart, reducing these lines to the requisite level. By carefully measuring the elevations and



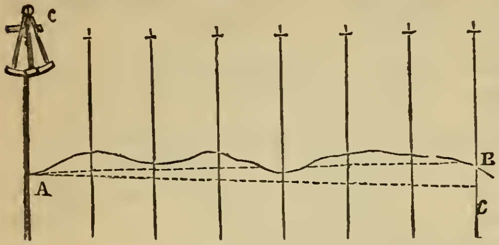
depressions in the ground left, which the correct basis thus provided furnishes, the necessary data for the exact level which can be maintained by the soil on the spot can be correctly estimated. The trenches themselves can then be elevated or depressed at pleasure, supposing the right level not to be known when they were formed. When this plan is adopted, the dotted line AB would represent the trench formed, and the dotted vertical lines the levelling-stakes. Grounds with a regular slope in any one direction are managed in a similar manner. Suppose the section that follows is to have a fall of 20 inches in 200 feet, proceed thus: Level the distance *ab*; look along the line to *c*; make the stake *c* level with *ab*; measure down 20 inches to *d*, and the line *ef* would form the top of the stakes. Then measure down from the top of each stake, the distance from *e* to E, and this would give the required level or even surface, EF. However, to make a line of this length, with 20 inches fall, and the levelling-stakes 10 feet apart, a piece of wood, 1 inch thick, must be placed on the top of each stake as you proceed. For instance, the level would rest on the top of the stake at *c*, but the inch would be inserted under the end at *b*; it would then rest at *b*, and the inch be moved on to the next, and so on throughout the entire line. The amount of fall in any given length being given, and the distance between the stakes ascertained, the thickness of the props used will at once be determined. But ground with an even fall is perhaps most expeditiously levelled by the aid of three borrowing-pins, as they are termed: they are simply upright splines of wood, say 2 or 3 inches wide and 1 inch thick, with a cross-piece of the same or greater dimensions, and from 3 to 5 feet long. White is perhaps as good a colour as any, with a black line across the centre of the top bar. Having ascertained the level at any two given points, insert one of the pins, leaving the notch at the bottom resting on the top of the stake. Proceed to the other end, and rest the pin on another stake, even with your intended surface; send a boy or man along the line to insert stakes at convenient distances, say 15 or 20 feet apart, and place the third borrowing-pin on them as he proceeds. When the eye sees the three pins—which, of course, are all of a length—at once, then the stake is right, and he immediately proceeds to insert and prove, and thus goes on through out the whole line. If the distance is too great to see the entire length, the observer, instead of continuing at one end, can follow within a few stakes of the operator, or the stationary pin can be inserted in the middle instead of at the end. This sketch will illustrate my meaning.



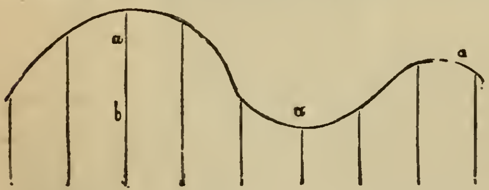




358. For levelling extensive tracts of country for railways, canals, &c., a theodolite, which is a spirit-level raised on three legs, and furnished with a telescope, is the instrument employed. A quadrant is also frequently used for the same purpose, and for determining the level of drains, &c. The following diagram and remarks are taken from Loudon's "Self-Instruction for Young Gardeners," the last contribution of that great and good man to a science that he loved better than his life:—"Suppose it were required to run a level through the ground indicated, AB, from the point A. Provide a few staves proportioned in length to the work in hand, and let them have cross-pieces to slide up and down; then, having firmly fixed the staff in the ground, to which the quadrant is attached at the point A, set the instrument in such a position that the plumb-line shall hang exactly parallel to the perpendicular limb of the quadrant; the upper limb will then be horizontal. This done, direct the eye through the sights, and, at the same time, let an assistant adjust the slides on each staff so as exactly to range with the line of vision. Then suppose the height AC to be 5 feet downwards from the upper side of the slide upon each staff, so shall the dotted line AB represent the level line required. Suppose the operation had been to determine a cut for a drain, to have a fall of 3 inches in every 20 feet, the distance between each staff in the above figure may be supposed to be 20 feet, then 5 feet 3 inches would have to be measured down the first staff, 5 feet 6 inches down the second, 5 feet 9 inches down the third, &c. &c. The dotted line AB would then represent the line parallel to the bottom of the intended drain."

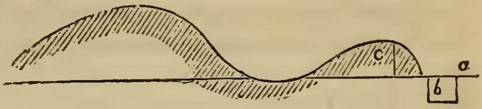


359. Where hills or mounds are to be thrown up, stakes should be inserted of the desired height, and a line stretched across their tops to show the conformation of the surface, as in the cut. These stakes, in all garden operations, should range from 10 to 20 feet apart, 15 being a good average; they are not only necessary for ascertaining the levels, but enable the men to perform their work with the utmost ease and certainty as to the result.



360. One of the chief things to be attended to in levelling, is to retain all the best soil for the surface: this increases the labour and expense, but is of the first importance in all garden operations. However, if judgment is exercised in the performance of the work, the surface-soil can generally be passed over on to the new level without the intervention of carts or barrows.

This will be obvious from the following section, in which *a* is the desired level, *b* an open trench to get rid of the worthless subsoil, and *c* the section of the next ground to be levelled. Of course, the surface-soil would be thrown from *c* into the trench *b*, up to the level of the line *a*; the subsoil would then be carted or wheeled where it was wanted, and the same process be repeated throughout the entire section. The new level would then be furnished with a depth of from 2 to 3 feet of good soil, fit for all cultural purposes.



361. Drains might also be inserted during the progress of the work, and thus the three important operations of levelling, trenching, and draining, proceed at once. All garden-ground should be trenched; for most purposes, from 3 to 4 feet is a good depth; even grass will *burn* less in hot weather, and look better at all times, if it has a depth of from 18 inches to 2 feet of good soil to grow in. The different effects of dry seasons upon lawns in the same localities arise chiefly from the varying depths of their soil: this has even more influence than their quality, for almost any poor soil will grow lawn grasses; and if too rich, the grass will become coarse, and militate against that elastic carpet appearance which constitutes the inimitable charm of British lawns. Where this is the case, part of the rich soil should be removed, and some of the poor soil mixed up with the surface intended for grass. Sometimes the soil of other parts is so poor as to be much benefitted by a liberal application of well-rotted stable or other manure. Generally, however, if it is well mixed, and not simply inverted, in the process of trenching, moved to a sufficient depth, and properly drained, the soil on the spot will grow most of the garden-plants well. Roses, &c., will require a richer soil, and azaleas, thalmias, &c., peat-earth to grow in. I have found rhododendrons generally grow almost as well, and flower better, in stiff sandy loam than in any other soil whatever. Where peat cannot be procured, rotten leaves converted into mould are the best substitute. If possible, all special soils should be introduced during the performance of the heavy ground-work incident to levelling, trenching, &c. This will prevent newly-made lawns from being injured by wheeling, on it, before they are properly consolidated. Walks should also be made, walls built, and steps erected at this stage of the proceedings; but the surface-gravel ought not to be put on until the turf is laid, and all the rough work finished.

362. And now, having got the ground into shape, and all the heavy work completed, if operators and proprietors could only be induced to rest from their labours for nine or ten months, they would speedily gain double that time in enhanced rapidity of growth, and more satisfactory results. The fact is, the ground ought to be furnished with a *green crop* of some description, to ameliorate its texture and clear it from weeds. Any part, too, that had been made up from a greater depth than others would have time to subside

between this and next October. However firmly the earth may be rammed, the subsidence is, to some extent, unavoidable; and the intervention of a green crop would allow the whole surface to be overlooked, and little inequalities remedied before permanent turfing or planting. Nothing can well be worse practice than planting upon crude newly-exposed, fresh-drained land. Such land is often more or less puddled during the operation; and it will be several years before the action of drains and the percolation of rain-water will remedy this evil. Fearing, however, that all have not thus "learned to labour and to wait," I will proceed with practical directions for laying down flower-beds, &c., advising every one, at the same time, to prepare for a crop of turnips, carrots, and potatoes, and to carry out these instructions next year.

363. All working plans, as they are termed, must be drawn to a correct scale, the larger the better,—a quarter of an inch to a foot is a convenient size. Having provided ourselves with a strong garden-line, several smooth round stakes, from 5 to 6 feet long, a quantity of small stakes to define the beds; a pair of wooden compasses, 5 feet in length, the legs being connected together with a perforated quadrant-shaped piece of iron, for fixing them at any distance required; a straight-edged piece of wood, say 10 feet long; and a square, with one limb about the same length,—we proceed to business. Mr. McIntosh, in his "Book of the Garden," gives a diagram and description of a very useful instrument, which it would be desirable to procure where there is much work to be done, although a line in a proper loop round a stake will perform the same work, but not quite so expeditiously. The instrument described by Mr. McIntosh is an upright pole, 2 feet in length, shod with iron, in which revolves a metallic tube, with a projecting shoulder, to which is attached by a screw a wooden rod, 8, 10, or more feet in length, marked in feet and inches. Upon this rod there is a movable iron slide, with an iron sharp-pointed stud. The 2-feet pole being placed in the centre, or point from which the figure is to be described, the slide is moved along the rod to the proper distance, and fixed there by means of a screw. An iron handle, turned up at the end of the rod, about 18 inches in length, is taken hold of; and, as it is moved round, the iron stud in the horizontal rod describes the figure intended. The first operation in laying down a garden will generally consist in determining the centre of the ground to be occupied, and then drawing a base-line, intersected by a perpendicular, the whole length and width of the space to be occupied. These lines will furnish the starting-points of most of our measurements, and it is of the first importance that they should intersect each other exactly at right angles. Everybody knows how to make a circle, and all figures whose sides are part of a circle are formed by its division into different parts. For instance, a pentagon is a circle whose circumference is divided into five,—a hexagon six, a heptagon seven, an octagon eight; and so on. If the operator is not furnished with a pair of large compasses, all regularly-curved lines can be described by a cord running loosely round a strong stake in the centre of the curve. Ellipses, or ovals, so frequently occur in gardens, that I will here describe several ways of forming them. The chief point to bear

in mind concerning them is, that the length must always correspond with the width. In cases where both length and breadth are given, the easiest way to proceed is as follows:—Make the line for the length, and another for the width perpendicular to it. Then take a distance one half the entire length of the oval, and place the stake or compasses at an equal distance on each side from the centre, and cut the base-line from each extremity of this line diagonally to the point where the oval inclines to its centre. Then insert two strong stakes at the front of the base-line; place a garden-line round them; draw it tight, and it will slip round the stakes and define the ellipsis. Ovals can also be formed by the aid of two, three, or four circles, as shown below.

364. In fig. 1, three circles are formed on the centre line of the oval, whose length is given. The outer edge of the two end circles forms the end of the ellipsis. Then draw the lines, *bc*, *af*, *ec*, and *ag*, and, where they cut the centre of the figure is the point for describing the sides of the oval. Placing a stake, or one leg of the compasses, at *a*, describe the line *gf*; then move to *c*, and describe *be*, and the ellipsis is completed.

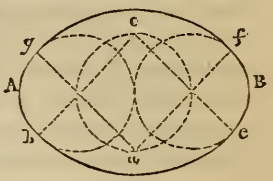


Fig. 1.

365. To make fig. 2, form two circles, II, I, whose circumferences will touch each other. Take the diameter of one, place the compasses in the centre of the circle II, already formed, and sweep upwards to *a*, and downwards to *b*; place them in the opposite circle, and sweep in the opposite direction. Where these lines intersect each other, draw two more circles of the same diameter, and those will form the end of the oval. Then place one end of the compasses at I, and describe the side from B to H; remove to II, and draw F to C, and the figure is complete. These circles may all be formed by means of a stake, to which a string is attached.

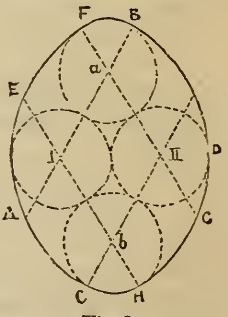


Fig. 2.

366. Fig. 3 is still more simple: divide the length into three equal parts; let the two points thus found be the centres of two circles, whose outside edges will form the ends of the ellipsis. Where they intersect each other in the centre of the figure will be points from which to complete the segments of its sides. I suppose every one knows how to erect one line perpendicular to another:—Let *ab* be a straight line from which a perpendicular line is passed at *c*. Measure any distance on each side of *c*, the same on both sides; place the compasses in each of the points thus formed, describe the lines at *d*; the point of intersection will be perpendicular to *c*. There is no

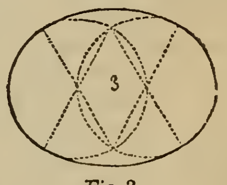
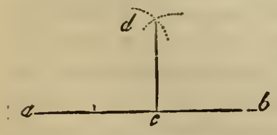
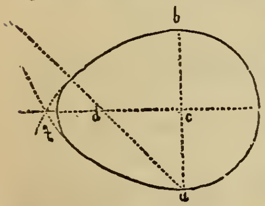


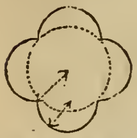
Fig. 3.

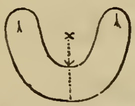


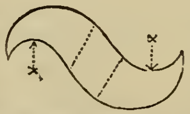
better method of forming curved lines than that described by Mr. Alexander Forsyth, in the first volume of the *London Gardeners' Magazine.* To form a volute with numerous spaces:—Make a circle around the centre of your intended volute, as much in circumference as you intend the breadth of your circuitous border to be. Stick the circumferential line full of pegs, and tie one end of a garden-line to one of them; then, taking the other in your hand, go out to the point where you intend the volute to begin, and, as you circumambulate, holding the line strained tight, you will delineate on the ground the figure required. To form the spiral line where the border is narrower, towards the centre, like the shell of a snail:—Make a circle as before, and, instead of driving the pegs upright, let them form a cone; or, instead of pegs, use a large flower-pot whelmed, and, if necessary, a smaller one whelmed over it. Measure the radius of your volute, and wind that complement of line round the cone in such a manner as to correspond with the varying breadth of your intended border, and commence making the figure at the interior by unwinding the line.

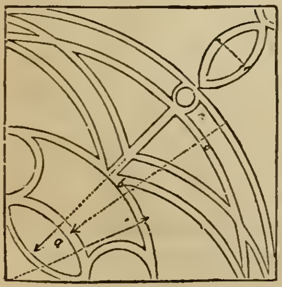


367. The following description of how to form an egg-shaped figure is from McIntosh's "Book of the Garden." The line *ab* being given, divide it into two equal parts; from the point *c*, where these lines intersect each other, construct a circle with the radius *ca* or *cb*; draw the line *cd* perpendicular to *ab*; taking *a* and *b* as centres, describe two arcs; draw a line from *b* through *d*, till it cuts the arc at *f*; then, with *d* as a radius, complete the figure. The following groups frequently met with in gardening are given, with their centres indicated, to facilitate their easy transference to the ground. They are copied by Mr. McIntosh from a German work entitled "Handbibliothek für Gärtner," by Ligilir, of Berlin.



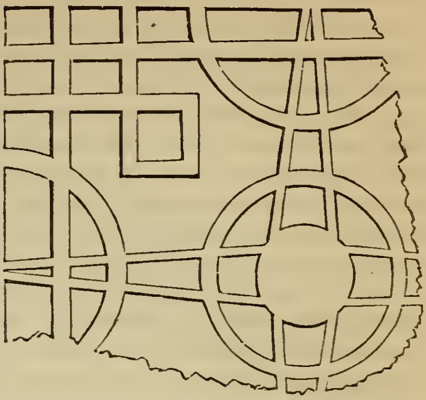




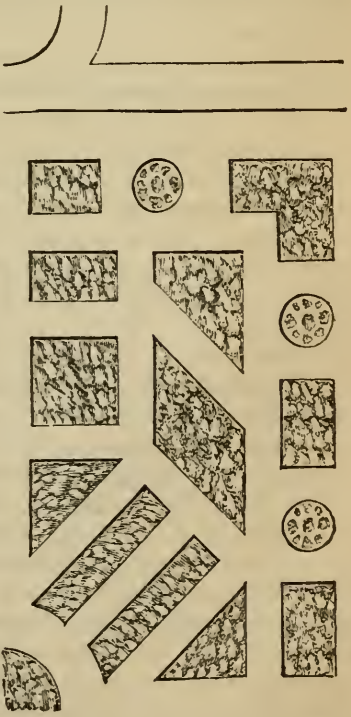


368. The plan, of which the design is a quarter, I would lay down by describing the entire circle *a*, drawing the double lines inclosing the space for turf or gravel at once; then, with the stake still at the centre, describe the circle *b*, and halve the distance *ab*. Now divide the circle *a* into eight equal parts, and draw the diagonal and straight lines as in the plan, marking out the circle *b*, and describing the elliptical and central figure; remove the compasses to the point where the diagonal lines cut the circle *a*, and describe the semicircular lines *c* and *d*, repeating the operations on the four points, and the chief part of the figure is constructed.

369. The accompanying diagram represents the centre and a quarter of the Dutch or French garden at Putteridge Bury, the seat of Colonel Sowerby. It would be best formed by drawing the centre and the four semicircles, then drawing the diagonal lines, and, finally, the straight ones. This garden is sunk about 18 inches or 2 feet beneath the surrounding surface, and has a beautiful effect when looked down upon. As it was laid down and is still under the management of my brother, Mr. Robert Fish, I hope to furnish the mode of grouping it for the calendar in April or May.



370. The annexed engraving represents a quarter of the centre of the chief flower-garden at the Duke of Grafton's, at Euston, the other three-fourths being exactly its counterpart. Beginning at the centre, it would be easily transferred to paper by dividing the dotted circle into an octagon, with the four centre sides longer than the four diagonal ones: the other lines being straight, need no instructions.



371. Irregular figures and elaborate patterns in box are not so easily managed, although many of them are susceptible of being formed upon certain and easily-ascertained principles. In cases, however, where it is otherwise, and the tracery is capricious and difficult to reduce to rule, there is no better mode of transference to the ground than by running lines across it in all directions, so that the ground is divided into a series of squares of equal size, corresponding to the same squares on the paper reduced to a scale. Holding the paper in one hand and a pointed stick in the other, almost any design may be copied in this manner. Of course, the plan on the paper will be divided into squares in the same manner as the ground. It would also facilitate the transference of all plans, if the chief points of formation were boldly indicated.

Generally, gardeners make rough plans for their own use; and certainly every design must be fully mastered on paper before there can be the slightest hope of success in placing it on the ground. It will be observed in every plan I have given, that the spaces between the beds are of uniform width throughout;—I never saw a plan look satisfactory on the ground where this was not the case. Sharp, irregular, angular pieces of turf or gravel, leading nowhere, may look very well on paper, but are most disappointing on the ground. Unless there are embroidery patterns of box or different-coloured surfaces, lay it down as a rule never to be infringed, that the spaces between the beds, whether occupied with turf or gravel, shall be of one uniform width throughout. The distance between them and the main walks should also be the same at all points; and, as a rule, this distance should be greater than the width between the beds. The distance of one figure from another must be determined by the size of the figures. On grass, however, it should never be less than 3, and need never exceed 12 feet. Small gardens on gravel may have the figures closer together; but much under 3 feet will give them a miserable puny appearance, and for large gardens 5 feet will be a good average. Six is also an excellent average for large gardens on grass; and 5, 4, down to 3, for those of smaller dimensions.

372. Sometimes gardens are laid down on a mixed plan of grass and gravel. When each bed is edged with brick, stone, tile, or cement, these edgings are occasionally surrounded with from 2 to 4 feet of gravel, succeeded by the same or a greater width of turf. Flagstones are also used for this purpose instead of gravel, as well as to subdivide groups of figures close to the dwelling-house. Beds on grass, however, unless much elevated above the surface, are most effective without any edgings whatever; although, in certain situations, raised beds, with massive edgings of stone or rustic-work, look well. Single beds of this description often have their tops converted into the form of baskets, tents, &c., to be covered with climbing plants or roses, with excellent effect. For beds on gravel, an edging of some kind becomes imperative. Of all living edgings box is the best; thrift, sedums, and saxifrages of various kinds, and the wonderful weed that the gullible thought was to banish grass from our lawns (*Spergula pilifera*), follow each other in value and adaptability for this purpose, in the order in which I have here named them. Ornamental stone, tile, brick, or cast-iron edgings, are probably better than any living edging whatever. They can neither harbour insects, exhaust the soil, nor look patchy through dying off; and, although perhaps more expensive in the first instance, the first expense is the only one. They can be purchased on the most reasonable terms, and of the most chaste patterns, and varied and elegant designs. Whatever edgings are used, they must vary in height and thickness with the size of the beds they define. Nothing can be in worse taste than a heavy massive edging surrounding a small delicate pattern, or *vice versâ*.

373. On sterile, uncongenial soils, it has been recommended by Mr. Loudon and others to inclose all the flower-beds with a brick wall to a depth of 2 or

3 feet, so that the soil could be entirely removed at pleasure. Where this is attempted, such walls would form an excellent base for the edging to rest on; and where such an operation is unnecessary, a layer of concrete 6 inches deep will afford the requisite solidity and stability. Groups of beds, or single figures for roses, may often be edged and embellished over their tops with chaste patterns, and Gothic or other arches of wire-work, to be covered with the climbing varieties. Such erections, while objects of great beauty in themselves, also diversify the sky-outline of our gardens, and relieve that monotonous beauty which seems almost to be incident to our present methods of furnishing them. The chief flower-garden here is bounded on three sides with arcades of roses, which I may again refer to when I furnish a plan, with the mode of grouping for the calendar in May.

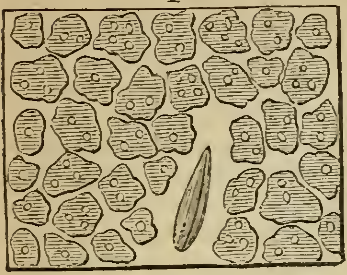
374. Having thus endeavoured so to display the art of laying out grounds as to enable every lover of a garden to form his own, and thus heighten his enjoyment by adding to his other pleasures the high and satisfying pleasure of paternity, I will now furnish a few hints concerning other special departments.

375. *Reserve Gardens.*—Utility, or fitness for the object in view, must be the principle embodied in laying out this department. This, however, is quite compatible with neatness and order; in fact, these are well-nigh indispensable to utility. To manage any piece of ground on the haphazard rule-of-thumb want of principle is the surest mode of making it of the least possible use.

376. No better system of laying out a reserve garden can be adopted than making a few good walks through the ground, and forming the latter into beds, say four feet wide, and any convenient lengths. Part of the ground can be left without division into beds, for raising hollyhocks and other large-growing plants, or for growing dahlias, &c., for exhibition or other special purposes. The beds will be used for raising annuals or biennials, for propagating choice varieties of pinks, carnations, polyanthuses, &c.; and for providing a reserve stock for verbena borders and flower-beds, and performing any operation that might render other departments unsightly. Roses might be budded, choice shrubs layered, seedling rhododendrons, &c. nursed, up here; new varieties of all bedding-plants preserved—seedlings, flowers—and any or every experiment to find out the capabilities of any given plant, made in this department. Rich beds would also be provided for growing and layering chrysanthemums, salvias, &c., for potting in the autumn. I would not advise the beds to be divided by any formal walks of gravel;—alleys cut off with the spade, from one foot to 18 inches wide will suffice. The relative position of beds and paths could then be changed every second year, and the whole ground enjoy the benefit of the highest culture. In wet weather, a few boards may be thrown down on the earth-paths by the men, when they come for the plants for transplanting, to keep the walks clean. A dry soil—of great importance everywhere else—is essentially necessary here; as the three great agents in the germination of seeds are heat, moisture, and air. An

excess of moisture, however, by reducing the temperature and excluding the air, decomposes the seed before the vital principle can develop itself. Hence the frequent complaint of bad seed on wet soils. This will be rendered still more obvious by the following diagrams, which prove the beneficial influence exercised by drainage upon the soil, and were exhibited before the Highland Agricultural Society by Dr. Madden, of Penicuik, in 1844. They are highly-magnified sections of soil in three different conditions. Under the microscope, soil is seen to be made up of numerous distinct porous particles. Fig. 1 represents it in a perfectly dry state; both the soil and the channels between being quite dry. Fig. 2, on the other hand, represents a soil perfectly wet; the particles themselves are full of water, and so are the channels between them. In fig. 3 the particles are moist, while the passages between them are filled with air. These diagrams show that soil in the condition exhibited in figs. 1 and 2 was totally unfit for the germination of seed. In fig. 1 there is no water; in fig. 2 there is no air; in fig. 3 both are present, in the proportions favourable to the growth of seeds, and those are requisite to insure the vigorous growth of the plant throughout all its stages; therefore fig. 3 is the condition of soil desiderated for all cultural purposes, and exhibits that congenial admixture of earth, water, and air, that plants delight in, and which efficient drainage only can provide for them.

1



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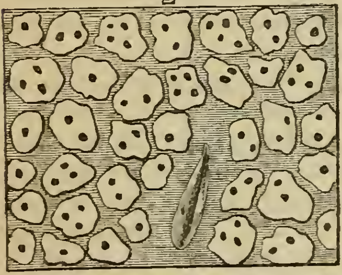

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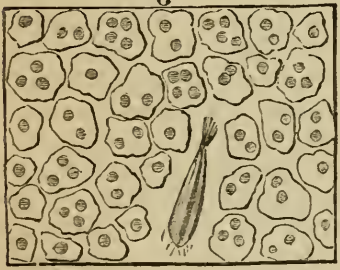


377. *Orchard.*—The grafting of most of our fruit-trees upon stocks being calculated to produce short stunted growth, has considerably modified the practice of hardy-fruit culture. Unless the demand for fruit is very great, I would not generally recommend the formation of orchards. I have, however, supposed the latter to be the case in the plan given at page 73, and have, consequently, indicated the position of the orchard. It will be seen to be entirely sheltered from the north and north-east, and hidden from the pleasure-ground by shrubberies. It has a gentle inclination, and full exposure to the south, and, both in form and position, is well adapted for its intended purpose. The soil is a good loam, 4 feet in depth, resting upon

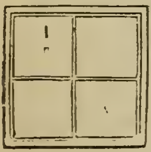
chalk, and it has been thoroughly drained by drains inserted 6 inches beneath the chalk-level, the tiles being covered over to that depth with broken stones. The permanent trees, which, as it is intended to lay the orchard down to grass, must be standards and half-standards, with from 4 to 6 feet of clear stem, should be planted in rows, from 30 to 40 feet apart, and in what is termed the *quincunx* style, thus :—

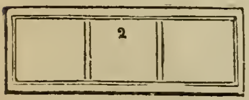
* * * * *

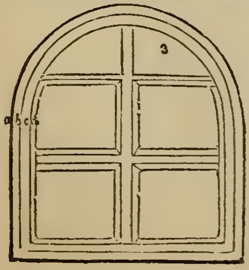
* * * *

The north or coldest side of the orchard should be planted with walnuts, cherries, medlars, chestnuts, &c., to provide shelter for the others. They might be succeeded by the hardiest plums and apples, to be followed by the tender pears on the south or warmest side. If a gradation of height were also followed, the shelter provided would be more efficient, and the general effect more pleasing. Filberts, mulberries, and service-trees, may also be introduced. But these temporary trees should be inserted as nurses between the permanent trees. Firm-growing varieties that come early into bearing should be chosen for this purpose, and they will not only encourage the growth of the permanent trees, but pay their own cost a dozen times over before they will require removal. They must, however, be carefully watched, lest they weaken the energy or destroy the symmetry of the permanent trees. The rows in this case will run east and west, which is, perhaps, as good an arrangement as any.

378. No better form can be devised for a kitchen-garden than a square, subdivided by two centre walks, as in fig. 1, or a long parallelogram, as fig. 2. Something like fig. 3 has also been recommended by Mr. Loudon and others, and the rounded part would make a beautiful fruit-garden. The same figure might also be rounded at both ends. The centre walk should pass through close at each end. *a* represents the wall, *b* fruit-tree border, 10 feet wide, *c* walk, 6 feet wide, and *d* border for dwarf trees or bushes, or the culture of strawberries, &c., 6 feet wide. Whatever shape is adopted, I think borders should always be introduced on each side of the main walks. Nothing tends more to relieve the heavy appearance of large masses of vegetables, and to confer an air of elegance to a kitchen-garden, than such borders. They are separated from the main vegetable compartments by small walks, from 18 inches to 2 feet wide. These walks can be edged with pebbles, and have a sprinkling of gravel, or simply cut off as alleys, and be left solid earth, at pleasure. If they are formed of some hard substance, all the wheeling can be performed on them instead of on the main walks.



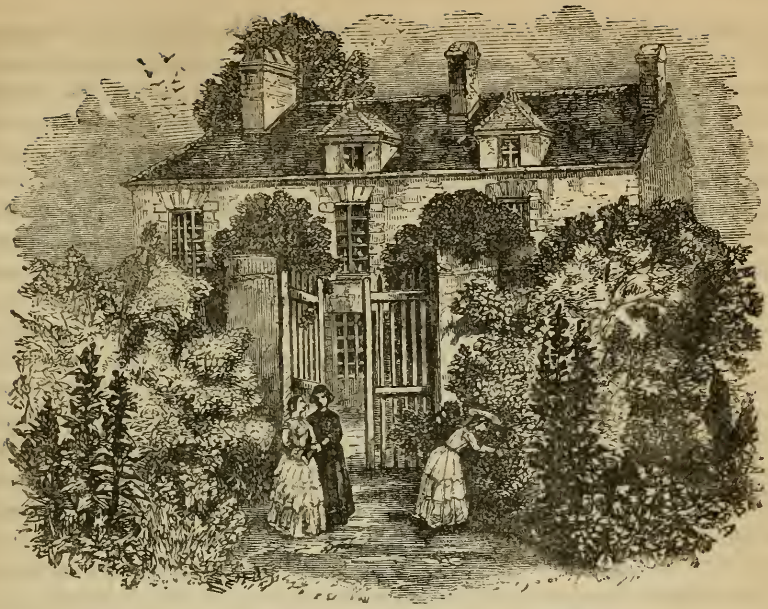




379. Perhaps the nearer to a level a kitchen-garden can be formed, the better. A slight inclination

to the south-east, south, or west, might be an advantage; on no account should it incline to the north. Some gardens, however, are formed on the side of a hill,—the Countess of Bridgewater's, at Ashridge Park, for instance,—and I believe it is very productive. Where it is nearly level, it may often be desirable to give fruit-tree borders a considerable inclination, to get the benefit of the sun's rays, and insure thorough drainage. Borders against the wall may be sloped in directions opposite to those which line the inner side of the walk. These borders have also a good effect laid on in round ridges. In level kitchen-gardens it is often desirable to throw up sloping banks or zigzag ridges for early and late crops. The south front of such banks, especially if a thatched hurdle or some other check to the wind is placed on the top, is equal to a south border; and the north side is equally useful for late strawberries, salading in hot weather, &c. Such banks are also most useful for training peas, &c., on table-trestles, within one foot or eighteen inches of the surface. Some of the borders at the side of the walk might also be occupied by iron wire for training trees or espaliers, table-trestles, &c. One should be devoted to rasps, planted 3 feet from the walks, and trained to a handrail at the side of the walk, from 3 to 4 feet high. The advantages of this system, on the ground of beauty, doing justice to the young wood, and the facility and pleasure of gathering, must be at once apparent.

380. The size of the kitchen-garden must depend upon the demands upon it, and the mode of culture adopted. It is bad policy to have it too large. It should be kept in the highest state of cultivation, and its productive powers stimulated to the utmost by liberal dressings of manure. The soil should be trenched at least 4 feet deep, and drained a foot deeper. All the coarse vegetables, such as Jerusalem and globe artichokes, horseradish, rhubarb, &c., should be grown outside the walls, if possible, in a slip by themselves. Herbs should have a border devoted to them, and be grown in beds 3 feet wide. Thus cultivated, the back-garden becomes a source of interest and an object of beauty, and they are easily accessible. But I forbear entering into details, lest I infringe upon the province of others. Suffice to say, that all I have here advised is as applicable to the plot a few yards square as to the nobleman's garden of 10 or 20 acres; and that I never could see why the kitchen-garden should not bear the impress of order, design, and high keeping, as much as any other part of the grounds, or why this need interfere with securing the largest amount of produce of the best quality from a given space, which should be the leading object in this department.—D. T. F.



CHAPTER XIII.

FURNISHING THE GARDEN.

381. THE new ground having been duly levelled and drained, and the foundations laid for the walks, so that only their last coating of fine gravel is required to give the finishing touch, the portion intended for cropping and for flower-beds, as I have already intimated, should either lie fallow for a season, or be sown with some preparatory crop, such as turnips or carrots. From this treatment, however, we must except the "reserve garden," on which the appearance of the flower-beds in the following summer must depend, the "orchard," and "fruit-garden," which take many years before the young trees arrive at a mature state. Perhaps, also, the "kitchen-garden," which may be cropped with such vegetable products as are found to be preparers of the soil.

§ 1.—THE RESERVE GARDEN.

382. As its name imports, the reserve garden is not meant to be a special object of beauty in itself, but to provide the means of upholding a continuous display of beauty elsewhere. Many plants that are totally unfit, from the short duration of their bloom, to enter the flower-garden as permanent occupants, may, with perfect safety, be transplanted there for the display of their floral beauty, and be returned, as they fade, to the reserve garden. Of this class is the whole race of polyanthuses, hepaticas, hardy auriculas, primroses

and violets. The winter aconite, Helleborus hyemalis and niger, Arabis verna, Alyssum saxatile, all the saxifrages, sedums, the campanulas, early-flowering phloxes, adonis, orobus, and other similar plants, should also be found here. All these, and any other plants of similar habit, may be moved into the flower-garden after the bedding-plants are cleared off in October or November, and taken back to the reserve garden in April or May, to make room for the more permanent flowering plants. Most of them are propagated by division of the root; and at the time they are transferred back to their summer quarters in the reserve garden will be the best period thus to increase the stock. When they are severally subdivided, it may be necessary to shade them for a time, as the profusion and perfection of next year's blossoms are dependent upon the healthy growth of their summer leaves. In no case, however, should shading be resorted to if the plants will bear full exposure to light and air without it; as direct sunlight is the great agent in elaborating the sap and inducing the production of flowers. The roots of some of the species, of which the Russian violet may be accepted as a representative, should be divided and young plants formed annually. Others, of which the Alyssum saxatile is a type, flower better, and are much more effective as large plants or patches.

383. The reserve garden is also the proper place for sowing hardy annuals in the autumn, for embellishing the flower-garden in the spring. They should be sown thinly broadcast in beds, in September or October, and the oftener they are pricked out or transplanted the better. The checks incident to such operations insure profusion of bloom and hardiness of constitution.

384. In rapid-growing plants the sap is not only more abundant, but more watery, or thinner, than in those of slower growth. The affinity of frost for water especially exposes plants in this state to the full force of its blighting power. The thicker or more highly elaborated the sap, not only the more profuse the bloom, but the greater the power of the plant to resist cold. Hence the safety of broccoli that has been heeled over, and of stocks that have been transplanted, when either, left to grow freely, are killed by the frost; and hence, too, the benefit of transplanting annuals that are intended to withstand the severity of the weather.

385. The following are among the best for this purpose:—Calliopsis Drummondii, C. tinctoria, Clarkia pulchella, C. p. alba, Collinsia bicolor and grandiflora, delphinums or larkspurs of sorts, Bartonia aurea, Erysimum Perovskianum, Eschscholtzia californica, Gilia capitata and tricolor, all the annual varieties of iberis or candytufts, Leptosiphon androsaceus and densiflorus, white and pink Virginian stocks, Limnanthes Douglasii, and all the varieties of Neomphila, Schizanthus humilis, porrigens, and Priestii, and Viscaria oculata, will also stand through ordinary winters, and be useful in furnishing the flower-garden in spring or early summer.

386. Many of the spring-sown hardy annuals would also be raised here, although in most gardens where they are extensively grown, the majority of them are sown either in patches or lines, where they are intended to flower.

387. The reserve garden is also the proper nursing-place for the whole race of half-hardy annuals. Stocks, asters, marigolds, clintonias, calandrinas, lobelias, mesembryanthemums, portulacas, œnotheras, Phlox Drummondii (varieties), salpiglossis, maurandyas, tropæolums, &c., raised on a slight hot-bed, must be gradually hardened off, and planted in rich soil in a warm corner, to be finally moved to their blooming-quarters. Hardy biennials, such as wallflowers, Brompton stocks, sweet-williams, foxgloves, &c. &c., should also be sown here in May or June, and receive their proper culture throughout the summer. Any perennials, such as hollyhocks, that are raised from seed, should likewise be sown in the reserve garden, and treated the same as biennials. Cuttings of any plants that will root in the open air should also be inserted here; and a corner should be devoted to shrubs that are intended to be increased by layering. Provision should also be made in this department for affording temporary shelter, and the means of gradually hardening off the whole stock of bedding-plants.

388. In places of any extent, the reserve garden should be furnished with ranges of cold and partially-heated pits and frames; and beds of rich soil, with raised edgings of brick, stone, or wood, spanned over with hoops, to support mats, canvas, reed coverings, &c., in cold weather.

389. In most gardens there is a sad lack of means for gradually transferring plants to the open air, and several months of beauty in the flower-garden are often lost in consequence. These raised protected-at-pleasure beds will also be the best possible positions for growing the choicest sorts of tulips, hyacinths, anemones, and other favourite flowers of early summer. I consider it better to plant hardy bulbs, such as crocuses, snowdrops, and the commoner tulips, say from one foot to eighteen inches deep, and leave them permanently in the flower-beds or borders, than to remove them out of the way of the bedding-plants annually. Those, however, who object to this treatment will of course provide space for them in the reserve garden, and remove them thither when they plant out regular bedding-plants in May. All surplus stock, to fill blanks or repair accidents, should be neatly plunged in pots, ready to be moved when wanted. Others, that root more freely, and bear moving better, may be planted in rich soil for similar purposes; if not required to fill up gaps in the flower-beds, they will furnish strong early cuttings and cut flowers throughout the season. When the reserve garden is of sufficient dimensions, the whole of the cuttings and cut flowers should be derived from it, thus leaving the flower-garden in full perfection throughout the season. For want of such a reserve to fall back upon, some gardens have no sooner arrived at perfection than they are fearfully mangled, and their beauty marred, by the imperious demands of the propagator and decorator. Choice collections of pinks and carnations, dahlias, roses, and chrysanthemums, for show flowers, should also be grown here. The arrangements and special culture that some of these flowers require to produce them in the highest perfection, are hardly consistent with the high finish and refined enjoyment which should be the leading characteristic of every well-kept garden. When the flower-garden is furnished

with shrubs for winter, space must be found for them in the reserve garden in summer. Small plants of hollies, laurels, box, acacias, berberries, sedums, thalmias, rhododendrons, and other flowering shrubs, are very effective and useful for this purpose. They may be either grown in pots, or carefully moved without pots. After a few years' transplanting in good sound loam, they will be furnished with such compact balls of roots, as to be moved with impunity at almost any period of summer or winter. Living plants are much better than branches of shrubs for relieving the bald outlines of flower-beds in winter. By studying the various shades of green, intermixing variegated varieties, and edging the shrubs with bulbs or other plants, to increase the effect, the garden may be made almost as interesting in winter and spring as at any other period.

390. The soil in the reserve garden should be varied, to suit its special uses. That most generally serviceable will be a rather heavy loam, which, by the addition of sand, leaf-mould, &c., will produce almost every conceivable variety best adapted to the varied purposes of this department. Some beds of peat should also be provided, and composts of various kinds laid up within easy distance. The size of the reserve garden will entirely depend upon the demands upon it. A plot a yard square may suffice for an amateur; a quarter or half an acre may be needful for some of our largest places. No garden, large or small, can be complete without one; for what the propagating, store, and growing houses are to the conservatory and drawing-room, the reserve garden is, or should be, to the flower-garden. It should not only be a great manufactory of raw material, but an inexhaustible warehouse, filled to overflowing with finished goods ready to be delivered whenever and wherever a supply is demanded.

§ 2.—The Kitchen-Garden.

391. Kitchen gardening is certainly the most profitable purpose to which a piece of ground can be applied; a shilling's worth of cabbage-seed will produce plants enough to crop several rods of ground, and will furnish greens in winter, and cabbages in summer, for a large family; but few who possess a piece of ground are contented with the mere cultivation of cabbages. The crops required for the kitchen are both numerous and varied; delicacies must be produced in season and out of season, and this requires both judgment in arranging and skill in growing them.

392. In laying down a plan of operations for kitchen-gardening, it is necessary to have an eye to the means of those for whose service it is intended. A kitchen-garden suitable for a gentleman's country seat would be little or no use to the cottager, and *vice versâ;* but although the minor details would be different, the broad principles are the same,—the soil and situation are to be adapted to the vegetables required, and the ground turned to the best possible account in both cases.

393. The best soil for kitchen-garden purposes is a mellow holding loam,

that is, loam which crumbles to pieces in working it, and yet is retentive of moisture. But it does not follow that other soils are not suitable for growing good crops: I have grown good vegetables on a light black loam with a gravelly subsoil, and also on heavy clay. Both may be worked advantageously by adopting the necessary tillage; a light gravelly soil, for instance, quickly loses moisture, the principal support of all vegetation; the surplus water quickly percolates through the soil or escapes by evaporation. But excessive evaporation may be prevented, and the plants invigorated at the same time, by a system of manuring the ground by mulching, that is, by spreading a layer of long stable-dung over the light soils, and a good crop of vegetables will be insured. Where the soil is heavy and retentive, as all clay lands are, it is necessary to dig or trench the ground a few weeks before cropping it; if it is laid in ridges in November or December, for instance, or dug level and left in coarse lumps, round which the air permeates, after a frost it will all crumble to a coarse powder under the March winds; while in summer, when it is sometimes necessary to dig and crop it, the ground is dug or trenched, and left in a rough state; the first drying day will render every lump as hard as granite, but a shower of rain makes them fall to pieces. If cropped while in this state, before the surface gets quite dry, it will work easily enough. This is of some importance; for in sowing small seeds it is necessary that the ground should be smooth and well pulverized, otherwise the seed will remain uncovered. Again, light soils quickly lose moisture, which is absorbed by the air; but quickly revive again, and the air is rendered mild and genial, as has been explained before; it is therefore evident, that certain crops which come in early, and are of short duration, are most suitable for such soils.

394. In the early spring months, a few sunny days, which would make no impression on clay land, make the light ground quite warm, and vegetation starts into growth at once. On a warm sunny border of light soil early salads and vegetables may be produced a month or six weeks earlier than on heavy retentive soils; on the other hand, heavy ground receives both heat and moisture slowly, and is very retentive of the moisture, retaining it after many weeks of dry weather: the heaviest and grossest-feeding crops are therefore most suitable for it during the summer, and will continue growing on it further into the winter if the water is not allowed to stagnate. Heavy summer and autumn, and late winter crops, will therefore repay the cultivator on such soils; but it is always advisable, where the soil is in either extreme, to dress it so that the light soil shall become more tenacious and the heavy more porous: this is done by mixing light soil with equal parts of fat unctuous loam, and the manure and mulching recommended above. The loam should feel doughy in the hand, and is best obtained from meadow land, taking the whole top spit, herbage and all, which is itself an excellent fertilizer. Where the common buttercup flourishes, there will mostly be found loam suitable for the purpose. Where the soil is a heavy clay, and there is no light soil available, burn a portion of the clay and mix it with the rest: this may be done either by mixing the burnt soil with the dung and applying it

as manure, or by mixing them up in trenching ; but an admixture of light sandy soil mixed with the manure is more economical and equally effective.

395. The same remarks apply to stony or sandy soils. A stony soil may be retentive and none the worse for being stony, except in working : I have seen some good crops grown on light stony soils. If the soil is sandy, let mulching form one of the chief items in its tillage, and it will repay the cultivator.

396. In selecting a piece of ground for garden cultivation, its situation as to hills, large trees, buildings, and to water, is important. Generally speaking, land situated on the banks, or very near large pieces of water, is cold and bleak ; the process of evaporation, continually going on, renders the air cold and raw in such localities ; and cold air, cutting winds, and cold soil, are most unfavourable to gardening. A thick brick or stone wall and row of trees on the water-side would reduce the one, and if the ground slope down to the water with a sufficient fall, good drainage will remove the coldness of the soil. If the land lies too low to be drained, the water lies stagnate, and the roots of the crops lie in an unhealthy cold bath, a situation in which few things will flourish.

397. In no case should trees be so close to the kitchen-garden that their roots obtrude into the borders : no culinary plant can get its proper supply while the fibres of a vigorous tree are appropriating the lion's share of its sustenance. Another objection to trees as a shelter is, that when most required they are least efficient. Denuded of their leaves in these seasons, they afford little shelter in the winter and early spring months. Where trees or buildings lie between the garden and the sun, crops which do well in the shade should be grown there. There are not many vegetables which prosper in such situations ; certainly it would be useless to try peas, beans, potatoes, or cabbages, under such circumstances ; but rhubarb, seakale, Scotch kale, and salads may do. On the other hand, it may be observed as a rule, that where a cabbage will grow vigorously and make a good heart, there any kind of kitchen crop will flourish. Hilly ground may be favourably situated or otherwise, according to the aspect. A northern aspect will probably be bleak, a south one warm and sheltered ; but success or failure depends on a combination of,—rather than on particular circumstances ; and a useful lesson in cultivation may be drawn from the weeds which flourish on the natural soil in the neighbourhood. If buttercups, docks, thistles, couch, and suchlike weeds grow luxuriantly, peas, cabbages, celery, &c., may be made to flourish : such weeds are an excellent criterion of fertility.

398. The kitchen-garden suitable for a suburban villa will altogether depend on the extent of ground attached to those residences. Let us, however, take one of medium size, inclosing an acre of ground, arranged as a pleasure- and kitchen-garden, as far from the house as possible, beyond bad smells ; although these may be prevented by means of lime, charcoal, or some other deodorizer. The melon-ground, like the kitchen-garden, will be greatly benefitted if some trees of dense habit, such as a belt of larch or other pines,

happen to be planted about fifty yards to the north or east of it, to break the force of cutting north winds.

399. Having already discussed the question of brick walls, we may only remark here, there can be no question about the advantages they offer, especially with a southern aspect. Walls with curvatures or piers to protect the wall-trees from cold winds, I consider useless, having known wall-trees bear yearly, for many years, an excellent crop of fruit, which ripened well without any such assistance on a wall facing the south, without any protection. But the trees were planted on a good holding loam; they were young healthy trees when planted, and they were kept in a healthy state by judicious management, in which disbudding was used more than the knife.

400. Respecting the paths, &c., the main object is to have them strong and durable, for a kitchen-garden should be so in reality; and, whatever is done to make it ornamental beyond keeping it very clean and sweet, must and does detract from its true purpose. In a kitchen-garden there is a great deal of wheeling in of manure and wheeling out of rubbish to be performed. Therefore, in forming paths, let strength and solidity be the chief considerations; see that the paths are high enough to allow for sinking, which is the result of constant wheeling upon them; and, as regards drainage, if paths are made very solid, they will not absorb water, and, if they are made sufficiently high and rounded, water will readily run off and find its way to the drains. If the walks are rendered impervious to wet, a good foot of ballast or coarse gravel will be sufficient; and if on this is placed a thin layer of fine gravel or coarse sand, it will take off the roughness. Where gravel can be procured, nothing can be better; but, if not easily procurable, well-burnt clay is equally efficacious.

401. In a large kitchen-garden, I would recommend two or three main walks, both for the greater convenience of cropping and working, and for more effectually carrying out a system of rotation cropping. Then, again, with regard to extent, an acre of ground may be both a large or a small kitchen-garden, according to what it is desired to grow in it. In places where the orchard is a separate department, and the kitchen-garden is devoted exclusively to vegetable culture, an acre of ground will yield vegetables for a large family; but, if it is thickly planted with fruit-trees in the form of standard dwarfs and espaliers, an acre will be insufficient. And, be it observed, the vegetables will not be so good; for good healthy vegetables require to be open to the sun and to the free circulation of air. Where there is room, let the orchard be apart from the kitchen-garden, and the result will be a thousand times more satisfactory.

402. In conjunction with a large kitchen-garden, there will necessarily be forcing-pits or houses; and it will be the province of the garden to grow subjects for them to a certain extent.

403. It has already been stated that the same crops grown successively on the same ground year after year, without addition to the soil, are found to impoverish it for that particular crop, still leaving properties in the soil which

are nutritive to others; thus, a crop of peas and a crop of wheat being sown on the same ground, and under precisely the same circumstances, it is found that the wheat will absorb all the silica from the soil, while the pea leaves this component part of the soil untouched. Some plants, according to Dr. Daubeny, absorb strontium; the spiral-rooted polygonium, while it takes up common salt, refuses acetate of lime; and so with many other plants. Cropping the land, therefore, year after year with the same plants has long been abandoned.

404. In the garden, where it is more difficult, from the limited space and numerous crops, to obtain a perfect system of rotation, it is sought to renew the constituents withdrawn from the soil by manuring, by ridging up vacant ground so as to expose the largest possible surface to the action of the atmosphere and the salts contained in the winter's snow, and by the admixture of virgin soil; but wherever it is possible, rotation of crops should be adopted. Mr. McIntosh recommends the following as one he has found successful:—

First Year.—Peas and Beans.
Second Year.—Broccoli, Savoys, Winter Greens, and other Brassicæ.
Third Year.—Carrots, Parsnips, Herbs.
Fourth Year—Onions, Turnips.
Fifth Year.—Spinach, Spring Onions, Lettuces, Cauliflowers.
Sixth Year.—Savoys, Broccoli, Winter Greens, Red Cabbage, Leeks.
Seventh Year.—Potatoes.
Eighth Year—Turnips, Cabbages, Leeks.
Ninth Year.—Celery, Cardoons.
Tenth Year.—French Beans, Scarlet Runners, &c.

Many modifications of this arrangement will be found necessary in practice, but something approaching it may be studied with advantage. There are, besides, permanent crops, such as asparagus, seakale, and artichokes, where no such rotation can take place. Other systems of rotation and grouping have also been proposed: I have met with none so complete, or so much to my liking, as that proposed by Mr. Errington, the experienced gardener at Oulton Park. In this system of grouping he places first—

405. The Deepeners; comprising asparagus, seakale, rhubarb, horseradish, and globe artichokes. These will require a deep soil; so that, before planting them, it is necessary to work the ground at least 3 feet deep, and, if the soil is good to that depth, 4 feet is better; they bear the third year, and should not occupy the ground more than ten or a dozen years, as young plants are more productive than old, besides their use as deepeners of the soil for other crops.

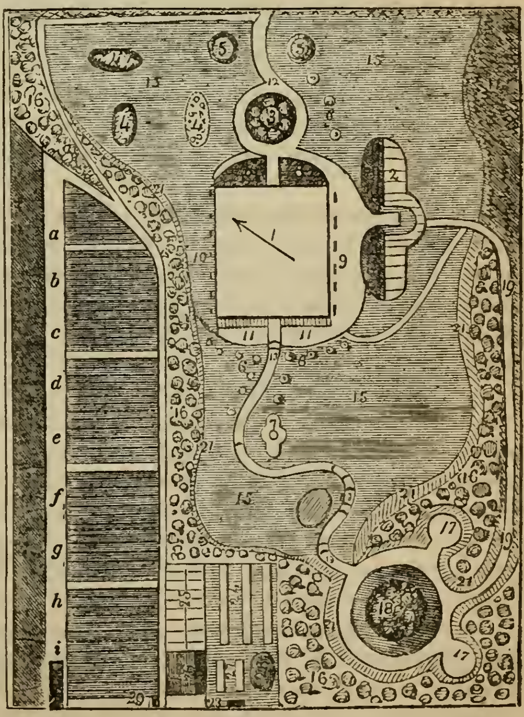
406. The Preparers, which are all root-crops, as potatoes, carrots, parsnips, turnips, salsafy, and scorzoneras; but Jerusalem artichokes, peas, beans, including scarlet runners, celery, onions, and such-like crops, being all, with the exception of salsafy and scorzoneras, of less than a year's growth, and, with the exception of most of the root-crops, requiring plenty of manure.

407. When these crops come off, the ground should be well manured; it will then be in first-rate condition for the next group,—namely, Surface-crops. These consist of saladings, such as lettuce, endive, radishes, corn-salad, rompion, American cress, parsley, spinach, French beans, early-horn carrot, and such light crops, being mostly of not more than six months' growth.

These always do best on a very rich surface-soil, containing plenty of manure, but requiring no deep digging. When these crops come off, the ground should have a dressing of manure mixed with fresh loamy soil; and, if the ground is heavy, a portion of burnt clay will improve it. This should be dug in one spit deep, or the ground may be bastard-trenched, that is, keeping the top spit on the top, and digging the subsoil two spades deep. I find that bringing up too much of the under soil engenders clubbing. Having so prepared the ground, it is in a condition to receive that group which is the most scourging and exhaustive crop of any, that is—

408. The Cabbage, or Brassicæ tribe, or Deteriorators, as Mr. Errington calls them, which are mostly biennials, and occupy the ground about a twelvemonth,—some more, others a little less. This latter group forms a much larger proportion of kitchen-crops than any of the surface-group; consequently, the ground occupied by the latter will not generally be sufficient for it; if there is ground to spare, it is advisable to let it lie fallow till the winter crops are ready to plant out, stirring the surface frequently so as to expose as much of the soil as possible to the air.

409. In the plan, which is repeated here, the quarters *a* to *i* of the kitchen-garden are supposed to be cropped for the first time, and somewhat in accordance with this scheme, *d* and *e* being the deepeners, with a row of plum-trees occupying the dotted line between them, and a bed of strawberries at each extremity of the quarter, in the following order;—1. Strawberries; 2. seakale; 3. rhubarb; 4. globe artichokes; 5. plum-trees; 6. asparagus; 7. horseradish; 8. strawberries;—*f* and *g* is occupied by the preparers and surface-crops, with a row of espalier or pyramid apple-trees on the dotted lines, in the following order:—1. Scorzoneras, salsafy, &c.; 2. potatoes; 3. peas; 4. apple-trees; 5. parsnips; 6. carrots; 7. turnips. The quarter *hi* is devoted chiefly to the deteriorators, or cabbage tribes, in the following order:—



1. Cabbages; 2. celery; 3. broad beans; 4. runner beans; 5. pear-trees, as espaliers, on the dotted lines; 6. runner beans; 7. broad beans; 8. cauliflowers; 9. early broccoli.

410. The angular corner, *a*, is devoted to Jerusalem artichokes, and the quarter *bc* to—1. Gooseberries; 2. a row of cherry-trees, on the dotted lines; 3. black currants; 4. red currants; 5. white currants; an alley, two feet wide, separating each quarter.

411. The broad border under the north wall is cropped with—1. Spring lettuces; 2. radishes; 3. early potatoes; 4. early peas; 5. early beans; 6. kidney beans; 7. early strawberries; 8. early-horn carrots; and other crops requiring a warm border. The border itself should not be less than 8 feet, and, if the wall is covered with peaches, it should be 12 or 16. When the front border is occupied with vegetables, we have seen it recommended somewhere, in the interest of the wall fruit, that a portion about 2 feet, sloping gently from the wall, should be reserved, elevated an inch or two above the border; thus forming a slight terrace, to be left uncropped, and kept free from weeds. On the north wall (it being understood that, in gardening language, the north wall means a north aspect) plums, cherries, and pears should be planted.

412. In dealing with asparagus, seakale, and other crops usually termed permanent crops, Mr. Errington selects from the beds what he wants each season for forcing, planting as much every year as he removes; those removed are replaced by celery, and the celery by the preparers, and these in their turn by the Brassicæ. The portion devoted to permanent crops, as well as the quarters devoted to bush-fruit, are thus brought into his system of rotation-cropping.

413. There are certain permanent crops, both of vegetables and fruit-trees, which will occupy the gardener in the autumn months. To begin with the borders; in preparing them, dig out the soil to the depth of 4 feet, and in this trench place first about a foot in thickness of brick rubbish, or any coarse stuff, which, when rammed down hard, will prevent the wall-trees forming tap-roots.

414. If the soil is naturally good loam, no more is required than to mix a quantity of well-rotted dung with it before throwing it back into the trench, making the border slope gradually towards the path. If the soil requires improving, get a quantity of friable loam, mix rotten dung with it in the proportion of one part dung to three parts loam, and mix this again with the soil of the border where the trees are to stand. Plant healthy young trees of peach, nectarine, and apricot, and, if desirable, with grape-vines and figs: these ought to be placed 12 or 15 feet apart; and I have seen a very convenient plan of growing grapes on a wall between the peaches. The latter were placed 15 feet apart, and a vine planted in each space halfway between; the vine was carried in a single stem to the top of the wall, where it divided into two stems, which were trained right and left under the coping; and as they were pruned on the spur system, they took up little room, and

did not interfere with the other trees. On the east and west walls plant trained trees of plums, cherries, pears, and mulberries, after the same rule, but without the same precaution as to soil, as these are not so particular.

415. In draining the kitchen-garden, one of the drains ought to run the whole length of the south border; for where peaches, nectarines, and especially apricots, are to be cultivated, the ground should be thoroughly drained; beyond this I would recommend no one to proceed in cultivating wall-fruit in the kitchen-garden. Curvatures in the wall, projecting piers, leaning walls and fences, covering the whole soil of the border occasionally, and such-like nostrums, are as well left alone, and the money spent on matters of real utility, such as orchard-houses.

416. In disposing of the main body of the garden, we have recommended dividing it into four equal compartments, by means of cross-walks three or four feet wide. If it is desired to have fruit-trees, plant a row through the centre of each quarter from north to south. I would not recommend more, for it should be remembered, that the more trees there are the less and poorer will be the crops, both of fruit and vegetables. As regards gooseberries, black, red, and white currants, and raspberries, I would strongly urge the propriety of planting one of the quarters with these, as arranged in a former page, in preference to the very common practice of bordering the quarters with them. This is done on a false notion of economy, while, in fact, it is a great waste; it is also done with the view of being ornamental,—it is, in reality, the contrary; and it involves the loss of these bushes as renewers and preparers of the soil for ordinary kitchen crops in connection with a system of rotation of crops, which will keep the ground in good heart without any intermission in the produce. It would not be difficult to point out the converse of this in some old suburban kitchen-gardens, which do not return the worth of the seed sown in them; where the soil is swarming with grubs, maggots, and mildew; where cabbages club and rot, tap-roots canker, and potatoes produce no tubers;—and why?—because the soil has been for many years overtasked, cropped highly, and injudiciously manured; whereas a proper system of rotation-cropping would have kept the ground in good heart.

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CHAPTER XIV.

MONTHLY CALENDAR.

§ 1.—ASPECT OF THE MONTH.

417. THE Gate of the Year, "the Entrance-hall of the Seasons," as it has been called, whose portico, supported by glittering pillars of ice, leads through long vistas of leafless snow-laden branches and frosted-work of silvery tracery,

> Of what may seem the sparkling trees
> And shrubs of fairy land,

to the vernal glories of spring, the flowery landscape of summer, and the russet and golden tints of autumn. January, divested of its poetical character, is the first month of our year, and the second of winter. The average temperature is 39° during the day and 32° during the night, and the mean temperature, during an average of many years, does not fall below the freezing-point; severe frosts, and frosts of long continuance, occurring in January, are therefore exceptional occurrences in our climate.

418. In the garden, January is the last month of preparation,—the processes of vegetation will soon be in full progress; for

"Nature even in her sleep is never still,"

and even now the sap is stirring in her veins. The good steward who has husbanded his time, may now seat himself, and with folded arms give himself up to contemplation,—not, however, without an eye to the future; for however far-seeing and industrious he may have been, he has still some work of preparation to complete. But what of him who has neglected to take time by the forelock? He must toil after the old scythe-bearer in a vain struggle to overtake him, for time once lost can never be recalled; and there are many things to be done in the garden in autumn, which cannot be so well done in any other season. There are, however, many things which may yet be done towards recovering lost time. Among these may be included all organic changes, such as taking in new ground, making new walks, draining, planting, and if the weather continues mild, pruning. Even at this dead season of the year,—

"When icicles are hanging
Like spears from every tree,
And beautiful to gaze on,
Is the frost-work tracery,"

a few flowers venture to put forth their blossoms; the garden anemone, the yellow crocus, and the herb-rosemary, "for remembrance," the winter aconite, the Christmas rose, with its white petals and yellow anthers and dark green leaves. The mazereon and the laurustinus enliven the otherwise deserted winter garden, and the snowdrop, in particular, the first pale blossom of the unripened year,—all these are found in secluded and sheltered spots in the garden, and under the hedgerows, towards the end of the month, in our less-exposed counties.

§ 2.—OPERATIONS IN THE FLOWER-GARDEN AND SHRUBBERY.

419. The old year is departed, and the somniferous influence of its latter days will soon be destroyed by the energy of its new-born successor. The gardener's attention must now be concentrated on the future, rather than diverted by the past. All arrears of labour due to the past year must at once be discharged. Nothing tends more to mar the success of gardening operations, than dragging through the necessary work, three weeks or a month behind the time proper for its performance. Not only our comfort, but our success, demands that we become thorough masters of our work, instead of allowing our work to master us. The peculiar fickleness of our climate renders gardening precarious and difficult enough with every advantage of judgment and foresight. It will be well, therefore, to bear in mind, that the work can only be done, "weather permitting." For instance, it is impossible to dig, plant, or sow, when the frost has set its strong seal upon the earth. It is bad practice to dig in snow, and worse than useless to attempt anything on the surface of the ground when an excess of moisture has converted it into mud.

It may thus occasionally happen that a part or the whole of the work prescribed for one month, may have to be deferred to another, and thus a double portion fall upon one or any of the winter or spring months. In such cases, extra labour must be employed, or diverted from other departments, until the whole of the work indicated is completed. There is a difference of several weeks in the climate of different parts of the country; operations that should be performed at once in the South, may thus generally be deferred for several weeks in the North. The term flower-garden seems almost a misnomer at this season. But now is the time to consider what can be done to prepare the garden for the return of our favourites; nor does its rough surface detract from their smooth and tender beauty.*

420. Now is the time to bring it into harmony with its refined and polished occupants. Is its shape uncouth, fantastic, and unmeaning?—let it at once be reduced to congruous design and elegant taste; is the garden too small!—enlarge it; is the soil exhausted?—renew it; is it naturally poor?—enrich it; is the situation bad?—choose a better; in a word, do any and every thing that industry suggests, foresight approves, and enlightened judgment commends, to furnish your plants on their return with all that is needful to add additional beauty and glory to their lives. I have already recommended all new flower-gardens to be trenched, and would now prescribe the same treatment for old ones. No soil, however rich in quality, will go on producing flowers in perfection for years, with an annual digging in autumn or spring, and frequent hoeings and rakings in summer: this practice soon exhausts the best soil. Nothing benefits old gardens more than the entire removal of the old plants, trenching up the soil to the depth of three feet, liberally manuring it, and replanting. Gardens furnished on the modern grouping system should be trenched every fourth or sixth year. The plants would then be much less at the mercy of the extremes of drought or wet, and have a more copious supply of suitable food.

421. The operation of trenching, simple as it appears, is often so indifferently performed, as to be of doubtful utility. I have seen the best of soils thrown into the bottom of the trench, and a foot of sterile clay brought to the surface.

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* The seasonal directions being calculated for the meridian of London, it may be useful to the reader, if we quote the comparative heat of the sun at several degrees of latitude, from the Rev. John Lawrence's "Pleasures and Profits of Gardening," 1000 being the unit, of which the following are parts:—

Places.	Latitude.	Heat June 10.	Heat Apr. 10 & Aug. 12.	Heat Mar. 10 & Sep. 12
Lyons	46	880	711	516
Paris	49	814	631	431
The Lizard	50	800	614	413
London	51½	777	597	388
Bedford	52	770	579	379
Northampton	52½	767	574	375
Boston	53	757	561	362
Lincoln	53½	753	555	357
York	54	742	543	346
Newcastle	55	726	524	320
Edinburgh	56	711	506	312

Such practice is to be avoided; for while most soils are improved by a slight admixture of the subsoil, such a nightcap would prove a quietus to the productive powers of many soils for many years. The process of deepening shallow soils must be gradual. The best mode is to bring up, say 6 or 8 inches of the subsoil, and mix it with the top soil; then dig up the bottom of the trench a spit deep, place a layer of manure on the bottom so loosened, and proceed filling up with the next trench, mixing the soil as much as possible, and incorporating the manure with it as the process goes on. The operation is performed by digging out a trench a yard wide and 3 or 4 feet deep, wheeling the soil removed to the other end of the ground; spread manure 9 inches or 1 foot thick upon the next yard of ground, dig up the bottom of the open trench, divide the yard of ground already manured in the middle, throw part of the manure from its surface into the bottom of the open trench, and then proceed right down the entire depth with this half-trench. Keeping the ground in the half-filled trench at a rough level, proceed to fill up with the 18 inches left; the result will be, that the top and bottom earth will not be simply inverted, but will be mixed with manure and thoroughly incorporated together. The next time the ground is trenched, the bottom spit of subsoil will be mixed with the other soil, and another turned up and manured as before. In this way, soil that was only from 15 to 18 inches in depth, will gradually be deepened to 3 or 4 feet, which is requisite to grow most plants in the highest perfection. The moment that flower-beds are cleared of their summer occupants, they should be dug up as roughly as possible. But rough-digging, while it can never present a *smooth,* may always exhibit an *even* surface, and, in that case, it is not unsightly. Besides, the objections against it would generally be silenced, if its obvious importance were understood. It would be difficult to say whether the mechanical or chemical influence in enriching the quality of the soil is the most important. Certainly both are of the highest value, and their influence will be powerful, or the reverse, in exact ratio to the quantity of *fresh* surface exposed to atmospheric influence. Hence the importance of rough-digging, of forking over ground in frosty weather; resulting in that finely pulverized, mellow, genial soil in spring, in which plants delight to grow.

422. Next in importance to draining, trenching, and manuring, and often of greater moment than any or all of them put together, I place the frequent digging, forking, and scarifying of the surface; and from December to April are the months specially adapted for these operations.

423. To grow bedding-plants in perfection, the beds should have a dressing of manure annually, or a heavier application every second year. It would be almost as reasonable to attempt to grow two crops of cabbages in succession, without enriching the soil, as two crops of bedding-plants. Many of them exhaust the soil more than any crop whatever; and to grow them rapidly, and in perfection, the beds must be liberally manured.

424. Shrubberies on poor soils would also be much benefitted by manuring. The usual practice of raking every weed and leaf off the surface, and cruelly

disrooting the plants by a deep winter or spring digging, may be designated the *barbarous starving* regimen. Once shrubberies are properly established on good soil, no rake should ever cross their surface; and every leaf that falls upon them should be merely dug in, any time from December to April,—the earlier the better. Leaves are Nature's means of maintaining the fertility of the soil; and whenever or wherever *art* removes them, without applying a substitute, the soil rapidly gravitates towards sterility.

425. Planting is best performed in November, for every kind of deciduous tree and shrub, and for most evergreens, although I have planted and transplanted evergreens in almost every month in the year. Whatever variety of opinion there may exist in reference to evergreens, there is no doubt whatever that the planting of all deciduous trees and shrubs should cease by the middle of December. This work should therefore be pushed forward in mild weather. One great point of success is to keep the roots of the plants as little exposed as possible: a dry wind, or a cutting frosty air, is fatal to them. The tops of plants are endowed, even when in a dormant state, with a wonderful power of resisting cold. As Nature never intended the roots to be exposed, and does not needlessly squander her resources, it is obvious that this power of resisting cold is not extended to them. Therefore all newly-planted shrubs and trees should also have their roots protected during the first winter with long litter, to prevent their being injured. When placed close together in nursery lines, plants shelter and protect each other, and the massiveness of their tops, and possibly their summer leaves, shield their roots from the frost. Their condition is widely different when placed thinly, in newly-formed shrubberies. Hence the propriety, and in many instances the necessity, if their lives are to be saved and their health preserved, of what is termed *mulching*, that is, covering the surface with some good non-conducting material. The next point of most importance in planting trees or shrubs, especially of large size, is to firmly secure the top to a strong stake, or by any other method, so as to keep it immovable in one spot. When it is otherwise, the trees, both top and root, are the sport of every fresh breeze; and the probability is, that after the roots have made a feeble effort to grow, and been forcibly wrenched from the soil, they will perish.

426. During this month, plant crocuses and any other hardy bulbs for succession: the main crops should have been planted in October or November. The usual mode of planting crocuses is in patches, varying from half a dozen to a dozen. They would be very effective in rows or ribbons of colour. The chief self sorts are white, blue, yellow, and purple; the striped varieties consist of these shades of colour in every variety of distribution. Size, consistence, shape, and distinctness of colour in the bloom, constitute the chief points in a good crocus. Nothing can be more easy than their culture. They are increased by offsets and seed, the former being the usual mode, as they increase rapidly. Offsets are treated the same as old bulbs, and will bloom the second year. Seed should be sown thinly, in well-drained pans of light sandy loam, as soon as ripe, and placed in a sheltered situation out of doors until late in the autumn.

During heavy autumn rains and the cold of winter, they should receive the protection of a cold frame. If sown thin enough, they may remain in the same pans during the first summer. When their foliage dies down in the autumn, they should be shaken out of the soil, and carefully planted in beds of mellow loam in the reserve garden, placing the bulbs about 2 inches apart and 3 deep. Here they will form strong bulbs during the third summer, and a few of them may flower, the most of them, however, deferring to do so until the fourth spring. Crocuses are very accommodating in reference to the depth at which they are planted; from 4 to 6 inches is, perhaps, the best average. When they are planted in beds devoted to bedding-plants, they will reach the surface and flower, if inserted four times that depth. As the young bulbs are formed on the top of the old ones, they thus possess a self-elevating power. Crocuses will flower freely for many years without being disturbed. The best growers, however, recommend dividing and replanting every third or fifth year. To secure perfect blooms, the foliage must be left to die down of its own accord. If planted in ribbon-beds, the following arrangement would look well:—Back row, David Rizzio, large purple; 2nd row, largest yellow; 3rd row, Flos niger, fine large blue; 4th row, Mont Blanc, or any other pure white: or the order may be reversed, or confined to three colours only,—yellow, blue, and white, or *vice versâ*. On wide borders, the same order may be repeated as often as necessary. The great point in this style of planting is to choose distinct selfs only, and not varieties of various colours. A row of snowdrops is often very effective in juxtaposition with a row of blue crocuses. The following are among the best varieties of this charming bulb; the price varies from 1*s.* 6*d.* to 3*s.* a hundred, and October is the best month for procuring and planting them, although they may still be inserted this month:—Aletta, Wilhelmine, Argent, Bride of Albion, Blucher, Bride of Lammermoor, Charles Dickens, Caroline Chisholm, Cloth of Silver, David Rizzio, General Todtleben, La Plus Belle, Lord Raglan, Mrs. B. Stowe, Prince of Wales, Passelonto, Sir J. Franklin (very large, but loose), Sir W. Scott, and Victoria Regina. Attend carefully to store pots and boxes; keep them as handy as possible; look over the entire stock, and see if any and what increase may be necessary.

427. Place verbenas that are to be propagated from into a gentle heat, and prepare a slight hotbed for striking cuttings. All bedding-plants will bear a much stronger heat while they are striking in the spring than in the autumn, and verbenas will root in a week, placed in a close pit, with a bottom-heat of from 80° to 90°.

428. Place scarce varieties of dahlias in heat, for the purpose of securing plenty of cuttings. Proceed with potting off singly all cuttings in store pots, using 48-sized pots for geraniums, and large 60 for verbenas, &c., where abundance of space is available. Where this is not the case, the potting-off must be deferred till another month.

429. Prepare a good stock of soil, clean pots, No. sticks, labels, stakes, &c., in bad weather, so that there may be no hindrance for these purposes.

during the busy season. No soil is better for the majority of bedding-plants than equal parts of loam and leaf-mould, and a sixth part of sand.

430. Keep the entire stock of cuttings free from green-fly, thrip, and all other insects; cover up, water, and give air with caution and judgment, and ever bear in mind that the beauty of next summer's garden is dependent not only upon the quantity, but the health and the cleanliness of your furnishing stock.

431. In the reserve garden, in very severe weather, autumn-sown annuals should be protected by having some boughs stuck among them, or by being covered with mats, canvas, &c. Dig and ridge all vacant ground, and get the beds intended for the main sowing of hardy annuals prepared for this purpose. Give beds intended for choice ranunculuses a liberal dressing of two-years-old cow-dung, and lay them up rough, ready for planting next month. Protect beds of hyacinths and tulips here or elsewhere during severe weather, as they are often injured when coming through the soil.

432. In the rose-garden, proceed with planting and pruning hardy roses, and protect Sea and China roses with boughs, covering round the roots with old tan, cinder-ashes, &c. A list of the best varieties will appear next month. Procure stocks for budding; liberally manure all the ground occupied with roses, and see that their roots are not injured during the process of digging. Florists' flowers require attention. Water auriculas, polyanthuses, pinks, carnations, &c., in frames, with care. Remove early blooms from polyanthuses. Examine pinks in beds, and if any of the plants are heaved up by the frost, press them firmly down in the soil.

433. Collect materials, and form new rock-works. Stone is the only really legitimate basis for scenery of this description; but as this is not to be found everywhere, and as the taste for rock-works is universal, why, we must submit to have rocks of clinkers, débris of pottery, bricks, cement, chalk, concrete, and timber. For position, form, and furnishing of rocks, see future numbers.

434. A collection of hardy heaths should be found near the rockery. A list of sorts, mode of planting, &c., will appear in the calendar for February. Sweep up leaves; roll grass and gravel; remove all litter of dead or dying plants; and let the impress of neatness and the stamp of order be everywhere apparent.—D. T. F.

§ 3.—OPERATIONS IN THE KITCHEN-GARDEN.

435. The work to be done in the kitchen-garden in January depends altogether on the weather. In open frosty weather no opportunity should be lost for wheeling manure on the vacant ground. All the refuse about the grounds should be collected and added to the manure-heap, and that burned or charred which will not readily decompose, and added it.

436. This is also the season when the forethought of the gardener may be exhibited. He has to lay down his plan of operations for the year, or at least for the

next three months; and on his judgment in doing this much of the successful cultivation depends. If he cover too much ground with early crops in these three months, not only will great waste arise, but he will have forestalled the space required for the main crops in April, May, and June, when some of the most important crops are to be sown. He should make his calculations now, so as to secure a constant succession of the various products as they are required, but leaving little or nothing to run to waste. It is a good practice, in going through the orchard, bush-fruit, and trees generally, to cut off all spare wood at this season, assort them as to size and shape, and tie them up in bundles ready for use as peasticks and other purposes.

437. The crops to be got into the ground this month are peas and beans, in the open ground or in cold frames; also in frames, radishes, lettuces (the black-seeded cos does well if sown early), Walcheren or early Cape broccoli, cauliflower; on a slight hotbed, early horn-carrot and potatoes; of course, those will be earlier and better for the assistance of a slight hotbed of two feet or so in height. A little parsley sown now on a slight hotbed will be useful for planting out early. A little celery for an early supply, and a little cabbage also, should these be scarce, or to fill up in case of the main crop, if thinned out by severe frosts.

438. At this season it is necessary to be provided with mats or litter to cover the glass, in case of sharp frost; for, though most of these crops are hardy, yet, when young and growing, they are not unlikely to be cut off by frosts. They are also much strengthened and hardened by exposure to the air in mild weather. A warm shower is also beneficial; but too much wet is injurious, especially in cold inclement winds.

439. Early peas may be got in any time this month, if the weather permits. Where the ground is tolerably porous and well drained, and a warm border, well sheltered on the north, is available; nothing more is required than to sow them in rows, 5, 6, or more feet apart, the rows running north and south; for dwarf peas, 5 feet will suffice. About London it is the custom to sow spinach between the rows of peas, the spinach coming off in time to be replaced with broccoli before the peas are over; but there is nothing lost by sowing spinach apart, and leaving the spaces between the peas till the time for planting potatoes, French beans, and other open-ground crops, taking care to leave sufficient space for the main crops. In warm situations and light soils, early peas will probaby have been sown in October. As they spear through the ground, some light litter should be placed over them in frosty weather, removing it in mild weather: by this treatment they will come in very early. Another method of forwarding them is to have some turf cut very thick, about eight inches wide, and of any convenient length. Make a groove along the centre, and sow the peas moderately thick in it, cover them with rich light soil, and place the turfs so planted under the stage of a greenhouse, or in a pit or frame. Towards the end of March or beginning of April, plant them out, burying the turfs completely in the soil.

440. Another method is to prepare some shallow boxes, about six inches

deep, filled with adhesive soil; this soil is drilled or grooved, and in the grooves the peas are planted; the boxes placed, as before, in a frame or under the greenhouse stage. When fully up, cut the soil into portions, each part containing a single row of peas; plant the whole in the open ground, burying the whole of the soil containing the peas.

441. Still another method is to use small 3-inch pots, in which clumps of peas are sown, which may be turned out into the ground without disturbing the roots. Where the garden soil is cold and heavy, it is advisable to adopt one or other of these methods for securing early peas.

442. For the earliest crop, none are better than Dillestone's early emperor or Sangster's No. 1, which grow from three to four feet in height. It is very necessary to mulch them, especially where the soil is light: it protects the young roots from frost, and saves watering and manuring the ground for the next crop, producing also a better and much earlier crop of peas.

443. In sowing peas, it should be either in double rows or in broad drills of not less than six inches in width; they should be scattered evenly, at regular distances apart, so that there may be no crowding; they should be earthed up when about three inches high, and the sticks put to them before they begin to be taller on one side than the other, but not till they really require it, as sticks are likely to draw them up weak, especially if they are sown too thickly. After sticking, they should be mulched, spreading the dung over a clear space of 18 inches on each side of the row, to the depth of three inches. In sticking peas, plenty of small brush should be placed near the ground, in order to conduct the peas upwards. It is useless to give them support above, and leave them without the means of getting to it.

444. Beans, like peas, can be sown in October, where the soil is light or well drained, and well sheltered; or, where the ground is heavy, they may be raised in a pit or frame by sowing three in a 4-inch pot now, and planting out in March; but if the soil is cold, and no conveniences are at hand for starting in pots, they may be sown in the following manner:--Let the ground be laid in ridges 3 feet wide, and 15 or 16 inches high, ranging east and west; on the south side of each ridge draw a drill halfway between the top and bottom, in which sow the beans about 3 inches apart: by this means they will be above the wet, catch every ray of sunshine, and will be stronger than if raised under glass and planted out. Peas may be managed in the same way. When about 10 inches high, level the top of each ridge to the row of beans behind it: they will not require earthing up again. If sown in October, a succession may be sown in January, in the same manner; and so on once a month till June: they do not bear well if sown after that. Those sown on level ground should have some earth drawn up to the roots when three or four inches high: this induces them to emit fresh roots. They are sown in rows about 4 feet apart, which leaves room for a row of broccoli, spinach, or lettuce between; but those who are not limited as to space had better allow 5 or 6 feet from row to row. On light soils the usual method is to stretch a line along where they have to be sown, and dib holes 4 inches deep, planting a row each side of the line, 4 inches

apart, zigzag fashion; but in wet soils it is better to drill them in, laying boards along the row to stand on, so as to avoid clodding the ground by treading on it. The sort usually grown for first crop is the early mazagan; but the early long-pod is equally early and prolific, and larger; so is the prolific long-pod, for main crop. I find the monarch long-pod as good as any. The green, and the hang-down long-pods are excellent beans. The royal dwarf is a good bearer, and of dwarfer habit. Whatever sort is grown, the culture is the same, and as it is not a favourite vegetable with many persons, the young gardener should consider well how much ground can be devoted to it without encroaching upon the space required for more important crops. A crop which is not required involves a loss of time, space, and nourishment, withdrawn from the soil.

445. Lettuces may be sown this month in a warm border under a south wall or fence: they are better sown in a frame at this season, if one can be spared, or even a hand-light is better than nothing. Wanting either, it is advisable to cover the seed, when sown, with straw or light litter, taking it off sometimes to give a dusting with lime, in case any slugs may be harboured; the ground should be well dug one spit deep, a dressing of manure being turned in, as this salad requires a rich soil to grow it to advantage. This is a surface-crop, and a light feeder; consequently, by giving plenty of manure, we not only insure good lettuces, but prepare the ground for a grosser-feeding crop, sowing the seed broadcast, and treading it in if on light soil. On wet ground, if apt to bind or clod, this is not to be recommended; but mark the ground into one or more beds, 4 feet wide, with alleys 15 inches in width between. Standing in the alleys, sow the seed, and press it in with the rake, or cover with some light soil. Where a succession of lettuces is required throughout the year, it will be necessary to sow once a month till March; after that once a fortnight, or every three weeks; for although a crop may last a month in moist weather, they are soon over in the hot summer months, and it is as well to be provided with plenty of young plants for succession. After August, once a month will be often enough. Sow the seed thinly over a piece of ground sufficient to grow a fortnight's supply; when large enough to transplant, thin them out to a foot apart, and plant the thinnings a foot apart on a piece the same size: those left in the bed come in first, and the others are ready to succeed them. In summer sow on a larger space, and let them grow where sown. Cos lettuces require tying up to blanch and crisp them. To do this expeditiously, provide a bundle of bast matting, cut to the required length, sling it round the waist, and, gathering each plant up, pass the hand rapidly round it: in this way a score or two may be tied in a few minutes.

446. One of the most hardy sorts, and best for sowing at any time, is the black-seeded Bath cos; it is very crisp, and of good flavour: another good sort is the Moor Park cos, and also the Paris white cos. Of the cabbage-lettuces, one of the best, especially for winter use, is the hardy Hammersmith; but it is apt to run in summer and autumn. The brown Dutch and tennis-ball cabbage are both good old varieties, and very hardy. The Malta, or drum-

head cabbage, is a fine large lettuce, and good for summer use, as it is not apt to run if allowed plenty of room. The advantage of cabbage-lettuces is, that they require no tying up, which prevents cos lettuces being serviceable in winter, they so soon rot off when tied; but such sorts as the London cos, which turn in without tying, may be grown advantageously in winter.—F. C.

§ 4.—HOTBEDS AND FRAME CULTIVATION.

447. No appliances are more useful than garden-frames, yet none are more generally misapplied in small gardens; many suburban gardeners considering them as proper only for the growth of the cucumber and melon, when, in fact, these should be considered but of secondary importance. Of course, whatever is grown in them being a matter of taste, that may be considered most profitable which is most in request; and, as the cucumber is popular, it may be as well to begin with that.

448. There is no fixed rule as to the best time for making hotbeds. If it is desired to have cucumbers at Christmas, the bed must be made early in October; if in January, early in November; and so in proportion, little less than three months being required from the time of planting to the time of ripening fruit at this time of the year. It is immaterial what time of the year is chosen to commence cucumber-growing; the only difference being, that in the spring and summer months the task is comparatively easy, requiring less labour and less material than in the winter. In the colder months the weather has to be battled with; in the warmer months the weather in a great measure assists. Supposing it is desired to commence in October, let a quantity of stable-dung be got together, proportioned to the size of the frame: two double loads for a three-light frame are usually allowed for the body of the beds; but it is as well to add an additional load, in which to start the plants. Having shaken it all together, laid it out for a week, and then turned it over again, take rather less than one load, and make a bed for a one-light frame. This may be put together roughly, as it is merely to raise the plants in, and may be pulled to pieces when that is accomplished.

449. The remainder of the dung should be turned over four or five times during a fortnight, and wetted, if dry. This preparation is most important; the inexperienced operator, unless he would run the risk of destroying his plants at the beginning, should follow it to the letter; for, unless the material has been well worked before the bed is made, it is apt to heat too violently, and burn the roots of the plants. In order to avoid this, it is advisable to use an equal quantity of leaves mixed with stable-dung for the bed: the leaves give a sweeter and more moderate, as well as more lasting heat.

450. When the material is ready, measure the frame, length and breadth, and mark out the bed, allowing a foot or 18 inches more each way for the bed than the length and breadth of the frame. At each corner of the bed drive a stake firmly into the ground, and perfectly upright, to serve as a guide

to build the bed by. Then proceed to build up the bed, shaking up the dung well and beating it down with the fork. The whole should be equally firm and compact, so that it is not likely to settle more in one part than in another, the surface being quite level. The frame and lights may now be placed in the centre, but the lights left off, so that the rank steam which always rises from a newly-made hotbed may escape.

451. These directions for the preparation of the material and making the hotbed apply to all such, whatever the size, thickness, or purpose; consequently, it will be unnecessary to repeat them; but there are other modes of making hotbeds. One I have adopted, which is very effective, while it greatly economizes the manure. The trimmings and prunings of trees are tied up into faggots, and with these the walls of a pit are built, the exact size of the frame: on this the frame rests. The faggots are fixed by means of stakes driven through them into the ground, the walls being about four feet high. After the frame is put on, the mixture of dung and leaves is thrown in and well beaten down; but the job of building a hotbed is dispensed with. The dung is piled nearly up to the glass, to allow for sinking; otherwise, the management was the same as for an ordinary bed. The advantage of this plan is, first, it requires a trifle less manure; secondly, the heat from the linings penetrates through the faggots under the bed, and is found more effective.

452. When the bed is made, the frame and lights put on, and the rank steam passed off, which generally takes five or six days, let a barrowful of good loamy soil be placed under each light; by the next day this will be warmed to the temperature of the hotbed, and the plants may be planted in it; no matter how small the plants are, it is better than raising them in the bed in which they are to grow, the shift itself being beneficial, and the time saved being rather more than a fortnight.

453. When the dung has lain the first week, the seed-bed is made. In three days the rank steam has passed off. A few pots with soil are then put in the frames. The next day the seed may be sown in these, two in each pot; in three days the plants will be up. They need not be re-potted or disturbed, but grown as they are; and, when the principal bed is ready, turned out of the pots with a ball of earth, and sunk in the new soil an inch or so over the ball of earth. If the bed now gives a moderate heat of 75° or 80°, and a sweet steam pervades the inside of the frame, the plants will soon root into the new soil, and grow very fast. Care must be taken, however, that the humidity is not too great, or that, in allowing some of it to escape, cold winds are not allowed to enter; an excellent preventive being to stretch a piece of fine netting or gauze over the opening.

454. In covering the lights, during frosts or rough winds, it is advisable to avoid letting the mats, or what not, hang over the sides, as there is often danger of conducting rank steam from the linings into the frame. Straw hurdles which exactly fit the lights are better than mats. The covering should be used just sufficiently to protect the plants from frost or cutting winds, without keeping them dark and close.

455. The heat of the manure is not lasting; consequently, the bed will require watching. It is advisable to have a thermometer in the frame, and as soon as the heat gets below 70°, apply a lining of fresh dung, which has been prepared as before, to the front and one side of the bed; and when this again declines, add another to the back and the other side. The bed can be kept at a growing heat for any length of time by this means, removing, at first, the old linings, and replacing them by fresh; but after a time, the roots will penetrate the linings, when they must not be disturbed: fresh dung must then be added to them.

456. When the plants have made two leaves, pinch out the point above the second; each plant will then send out two lateral shoots above the second leaf of each shoot: pick off the top. After that, stop them above every fruit, and, as the plants grow, add fresh soil, till the whole bed is level, taking care that the soil is of the same temperature as the bed before placing it in the frame, or the plants are likely to receive a chill, which throws them back considerably.

457. It will be necessary, between the months of October and April, to set each fruit as the flower opens. This is done by taking a male flower, and pulling off all but the centre (that is, the stamens supporting the anthers, which hold the farina or pollen), and applying this to the centre of the female flower, which may be distinguished by the rudiment of the fruit supporting it. This, in the warmer months, is the office of bees. Attracted to the flowers by the honey and pollen, they fertilize the female blossom in collecting it; but when there are no bees about, the cultivator must perform the task himself.

458. The culture of the melon is very similar. The preparation of the manure, making the bed, raising the plants, the stopping and setting, are the same; but the soil in which they are finally planted should be trodden down rather firmly; and as the fruit appears all nearly about the same time, it is advisable to have them swell off as nearly as possible together; otherwise, the most forward will take the lead, and become much larger than the other. Two melons on a plant are as much as can be expected to do well; but never more than three should be allowed to remain: pinch off all the rest, and every other unnecessary growth. It is important that the plants be not allowed to ramble after the fruit has begun to swell; for this will require the whole strength of the plant. The fruit takes some four or five weeks, occasionally more, from the time of setting to the time of ripening, which is indicated by the stalk appearing to separate from the fruit. They should be cut and used on the day this takes place, or very soon after.

459. Asparagus and seakale are both successfully forced in the frame and melon-pit; but asparagus-plants are not fit to move before February. The usual plan is to make up a 3-foot bed, and cover it with 3 inches of loamy soil, before putting on the frame: this allows more space inside. When the frame is on, and the bed of a right temperature, a little soil is put at the back of the frame, in the form of a bank, about 6 inches high, and sloping

to the front. On this bank, place a row of seakale-roots, laying them almost flat, as this admits of covering them, without an undue thickness of soil. When the first row of roots are laid, cover them with a few inches of soil, and make another bank 6 inches from the first, on which lay another row of roots; and so proceed till the frame is full. To maintain the temperature of the bed, the same directions will apply as mentioned elsewhere; but the light should be excluded entirely from the frame, otherwise it will not acquire that whiteness and delicacy for which forced seakale is valued.

460. For the purpose of growing very early potatoes, nothing is more suitable than a broad roomy melon-pit, an excellent use to make of it. The potatoes will be fit for use about the time for planting out the melons. About the beginning of January, let some middling-sized tubers be laid in a warm and moderately dry place, well exposed to the light: here they will make short plump shoots by the time the bed is ready. Prepare a quantity of dung sufficient to make a bed 3 feet 6 inches in depth. By the end of the month the bed will be ready; then lay on 3 inches of soil, and place the potatoes 15 inches apart, covering them with 6 inches more of soil. Some seed of the scarlet short-top radish may be scattered over the surface. As these begin to grow, give abundance of fresh air in mild weather, so that neither potatoes nor radishes be drawn up; and as they come up, remove the radishes from immediately about the crowns of the potatoes: earthing up the latter will not be required. The radishes will draw in March; the potatoes early in May. Some prefer growing radishes in a separate frame, by making up a bed two feet in height, on which a 2-light frame is placed. Over the hotbed place about 10 inches of loamy soil, on which the radishes are sown broadcast or in rows, the former being preferred: press the seed in with the back of the rake. This may be done from the beginning of January to March; but if begun very early, a little auxiliary heat, by means of linings, is required as that of the bed declines. When potatoes are grown in a frame, the treatment is much the same as before; but some grow them very successfully in this manner:—The frame being placed on a level piece of ground, the soil within is dug out to the depth of 2 feet, and banked round the outside of the frame. The pit thus formed is then filled with prepared dung; on this 3 inches of soil is placed; then the potatoes, then 6 inches more soil. The potatoes, when planted, should be just starting into growth; but the shoots should never be more than half an inch from the tuber, or they do not grow so strong. It is advisable to pick off some of the shoots; three on each tuber is sufficient.

461. Early carrots may be grown as directed for radishes: a bed two or three feet high, about 10 inches of soil, which should be perfectly sweet, and free from the larvæ of insects: a bushel of pounded chalk mixed with it will be advantageous; the early-horn being the best for early culture; but, as the seed is very light, and hangs together, it requires, for the purpose of separating it, to be rubbed up in a peck or so of tolerably dry soil, which will help to bury it when sown, using the rake to press it in. When up, and suf-

ficiently large to handle, the plants should be thinned to 2 inches apart, and plenty of air given, or they will be drawn all to top. Mustard-and-cress is usually sown round the edges of carrots or potatoes, or, indeed, in any such space that offers; but, where a succession is required, it is worth while to give it a frame to itself. On a one-light bed two feet high let the seed be sown, and, when that is up, sow another light; when the first is all cut, pare off the soil containing the roots, replace it with new soil, and sow again, either in drills or scattered evenly, but thickly, over the surface and pressed into the soil.

462. Kidney-beans may be grown on a hotbed, but they are better grown in pots, or they are apt to run all to haulm and leaf. In an ordinary hotbed, as if made for cucumbers, place as many 6-inch pots as will stand 15 inches apart. These pots being filled with good loamy soil, in each plant, triangularly, three Newington-wonder beans, which is of small dwarf habit and a great bearer, and, as they grow, give them regular waterings; but they need not be removed, and the heat should never fall below 60°. They are very susceptible of frost, and will require careful protection from it, in common with all forcing plants. Nothing can be better for covering the lights than hurdles made of lath and straw. If sown in January or February, they will bear in April or May. They sometimes require supporting with sticks.

463. Endive may be planted in the frame in September, and blanched for use in the winter, by inverting flowerpots over each plant,—just clapping the pot over the centre of them, but by no means tucking the leaves into it. Mustard-and-cress, if sown in a cold frame in October, will last a long time, if protected from frost. Strawberry-plants may be potted up, or the runners laid into pots, and placed in a frame: they will bear much earlier than in the open ground, and if treated occasionally to liquid manure, they will bear as abundantly.—F.C.

§ 5.—Plant-Culture under Glass.

464. Without protection of some kind during the winter months, no collection of plants can be kept together; but when mere protection is all that is sought, it is easily obtained; a trench 2 feet deep, dug in the ground, if the soil is dry, and a drain at hand to carry off surface-water, will suffice, if covered with frames, straw, hurdles, or other efficient covering; for it is ascertained by numerous experiments, that the earth at 2 feet deep is warmer by two or three degrees than the surrounding air in winter. A vacant frame, a cold pit, a greenhouse, or a conservatory, will also either of them serve the purpose. On the other hand, where plants of a warmer climate are to be forced into early bloom, or where exotics are cultivated, artificial heat must be applied, not only to keep out the cold, but to similate their native climate and atmosphere.

465. The arrangements to effect this, in time past, have been confined to the greenhouse, generally a lean-to structure placed against the wall of some other building, heated by flues or hot-water apparatus, to pits of various constructions, or to simple frames adapted for heating by hot dung; while places of

greater pretensions add to this a conservatory, which is a structure of the same character as the greenhouse, but larger and more ornamental, being, in fact, the show-room of the establishment, to which the finest plants are removed when coming into bloom. When we frame our calendarial directions, so as to assist the tyro in the management of these numerous structures, we shall best convey them by assuming the existence of a range of houses combining economy of space with perfect efficiency, the whole or any part of which can be constructed at a moderate cost. In a future chapter the details of construction and cost, with its various arrangements for heating and ventilation, will be given; but, in the meanwhile, we may state that it consists of a span-roofed house, ranging east and west, which may be 18 feet wide by 30 feet in length, having a central pathway, with beds on either side for plants to be planted in, or stand in pots; one half of the house being a greenhouse, the other half a hothouse, separated from each other by a glass partition. On the north and south of the house is a range of pits 12 feet wide, those running parallel with the hothouse being warm pits, and those alongside the greenhouse cold pits.

466. The whole range of houses are heated by a coil of 3-inch pipes in the hothouse, and 2-inch pipes in the pits. Under the beds in the hothouse, and also in the warm pits, are hot-water tanks heated by 2-inch pipes, these being connected with the boiler fitted up at the north extremity of the hothouse; stop-cocks or valves attached to each set of pipes, permitting of the whole or part of the apparatus being used, as convenience requires.

467. This efficient range of buildings may be connected with the dwelling-house by a conservatory, or arcade covered with glass, with great advantage, should the establishment possess such adjuncts; or it may be isolated from it in the melon-ground.

468. The Hothouse, or, as Mr. Errington calls the forcing-houses, the "persuading-houses," may be devoted to the cultivation of orchids, for which it is admirably adapted; or it will yield abundance of roses, melons, cucumbers, vines in pots, or, in fact, anything to which it is applied.

469. The Greenhouse may be heated by continuing the pipes to any required degree, according to the number of pipes introduced.

470. The Cold pits, adjoining the greenhouse, will be found very useful for growing mignonette, violets, stocks, and other things which only require protection. In the Warm pits, flowers, such as roses, achimenes, Poinsetia pulcherrima, cinerarias, heaths, epacris, primulas, azaleas, acacias, camellias, arums, chrysanthemums, mignonette, cyclamens, and other plants required at this season for the windows, the conservatory, and for cut flowers, or any other of the multifarious uses to which a pit can be applied in winter.

471. *Forcing-houses.*—The routine business here during the month commences in earnest in January; a few plants of all kinds for ornamenting the house and conservatory should be introduced and started gradually; Indian azaleas, bulbs, roses, and lilacs, if already somewhat advanced, should have others brought forward to succeed them. Towards the end of the

month, a good stock of pinks, sweet-williams, and lilies of the valley, should be started in pits or frames. The temperature of the forcing-house should not be suffered to fall below 50° ; and as the days lengthen, the temperature should be increased 4° or 5° until it attains a minimum temperature of 60°, and a maximum of 70°, by artificial heat, and an increase of 10° by sun heat; giving air daily, even if for a short time only, and keeping the atmosphere always moist and genial by syringing or watering the pipes and flags.

472. *Greenhouse.*—With the opening year and the lengthening day, the busy season in the greenhouse commences ; plants of all kinds begin to move, and most of them may now be assisted with a little heat. Soft-wooded plants may be stimulated by it ; and, when they begin to grow, moved into the larger pots, in which they are to flower; while those which are more advanced and showing bloom, may be introduced into a warmer place. Many cinerarias are now in bloom, and may be removed to the window or conservatory, while those reserved for blooming in May and June should still be kept in cold pits or frames, taking care to guard them from severe frosty weather, and especially from moisture. If large cinerarias are required, shift a few into larger pots, and pinch off the tops to produce a bushy head, tying or pegging down the side-shoots to keep them open, keeping them supplied moderately with moisture, and giving air on every possible occasion.

473. Fuchsias may be started this month, and large early-flowering specimens produced by cutting down the old plants and shaking the roots out of the old soil as soon as they have broken, re-potting them in a good rich compost, with sufficient drainage. Strike cuttings for bedding-plants as soon as the shoots are long enough.

474. Calceolarias require great attention as to watering. Remove all decaying leaves as they appear, peg down the shoots to the soil, that they may root up the stems and thus strengthen the plant. As seedlings advance, shift them into larger pots, and prick off those sown for late blooming. In potting, use a compost of light turfy loam, well-decomposed manure and leaf-mould, and a liberal portion of silver-sand, with an ample drainage of potsherds and charcoal, and keep them free from insects.

475. Pelargoniums which are strongly rooted may be shifted into larger pots and stronger soil, using silver-sand freely, taking care that the pots are clean and dry and the drainage good. Stop some of the plants required for succession, remove decaying leaves, and thin out weak shoots. Stake and tie out the shoots of those sufficiently advanced, to admit air to the centre. In plants of dwarf habit, peg the shoots down to the edge of the pot, to encourage foliage. Stir and top-dress the soil from time to time, if required : a watering once or twice with lime-water and soot imparts a rich dark colour to the foliage, and destroys worms in the soil.

476. Where early flowers are required, and a stove or hothouse or other forcing convenience is at hand, remove a few plants, such as Admiral Napier, Alba multiflora, Amas, Jenny Lind, or any more recent early-flowering sort, for forcing.

477. Should frost appear, or the weather prove damp, light the fires in the afternoon, and shut up the house before the sun disappears, keeping the heat as low as is consistent with keeping out frost and dispelling damp, giving all the air possible in fine weather. Water those plants which have become dry, but water them copiously. The fancy varieties, being the most delicate, should be kept in the warmest parts of the house, and their foliage thinned out occasionally. Use fumigation, to prevent the appearance of the green-fly.

478. A constant and ample supply of compost, well turned and thoroughly dry, should now be prepared for spring potting, and the pots washed and dried for use when wanted.

479. It is usual, where circumstances permit, to grow hard-wooded plants, such as heaths, azaleas, camellias, and others of similar habit, in a separate house; and some cultivators go so far as to recommend those having limited accommodation to confine their culture to one family, contending that it is better to have a houseful of finely-grown heaths, geraniums, or camellias, as the case may be, than a miscellaneous collection of indifferently-cultivated plants. This, however, must be a matter of taste.

480. Care should be taken that hard-wooded plants do not suffer from the absence of moisture at the roots. After severe frosts, when the fires have been used, the evaporation by the sides of the pots is very great; while the surface seems to be moist enough this should be seen to. With camellias and other plants of similar habit advancing into bloom, occasional doses of manure-water in a tepid state should be given, and the plants syringed with tepid water every other day, until the flowers begin to expand.

481. Among the hard-wooded plants, the same remarks respecting heat are applicable; a temperature of 40° should be aimed at during the night, rising a little by natural causes during the day. Air should be given from above or by means of ventilators, without exposing the plants to cold draughts, and a moisture encouraged by sprinkling the floor, flues, and pipes, when warm, with water.

482. With heaths, guard against mildew, but water moderately. Avoid artificial heat if possible, but keep out frost; and, if heat becomes necessary, remove such plants from its influence as are required for later flowering.

483. Camellias should now be advancing into full bloom, and the young expanding buds should be protected from cold currents of air, but without much fire-heat.

484. Azaleas should now be growing freely, if they were shifted and promoted to a warm place last month. To get early-flowering plants, some of the more advanced specimens should be introduced to greater heat, while others are retarded for a succession, to supply the conservatory or window-cases. An Indica alba is a fine early-flowering variety.

485. The Conservatory, being only a more ornamental variety of the greenhouse, the same directions apply to it. Being generally a lofty building, however, the conservatory is not so well calculated for growing plants unless they be of a climbing habit, when they may be displayed to great advantage. Every-

thing here should now look fresh and healthy. Acacias should be advancing into bloom. Camellias are either out or advancing rapidly into bloom: to promote this, see that they do not want for water. If there is a stove in the establishment, many orchids, hyacinths, arums, tulips, and other bulbs, with heaths, epacridæ, from the greenhouse; and if only a frame is available, cinerarias, violets, and mignonette, will render the conservatory both gay and fragrant.

486. To preserve all these in bloom for the longest possible period is now the object; keep the atmosphere moist and genial, but not wet; water regularly when necessary, especially the bulbs, giving as much water, of the same temperature as the house, as they can assimilate; keep the temperature about 40°, rising a few degrees from sun-heat during the day, ventilating daily, if only for a short time, but avoiding cold draughts of air.

487. Vines, where they form a feature in the cultivation, are usually cultivated on some principle of succession, either by dividing the house by partitions, or by having a succession of houses. Supposing the plants to have been started in October, they would break last month with a temperature in house of about 70°. This should now be the point aimed at, the minimum being 60° during the night. The actual heat, however, should be regulated by the state of the external border. If the heat is falling there, then fresh heating materials must be applied there; for on that depends the result. Later sections may follow for succession, beginning at a lower temperature, and increasing the heat gradually as the vines break and advance. Vines in pots, if started in October, and exposed to regular heat, will now be setting their fruit; they may be pushed on vigorously; for the roots being entirely under control, there is less danger of the plants being injured by over-forcing. Fresh plants should be brought forward. This may be done by plunging them into a hot-bed and frame, and adding linings to keep up the heat until they break, when the heat of the vinery will be found sufficient. The plants showing fruit should be assisted by occasional applications of manure-water in bright weather.

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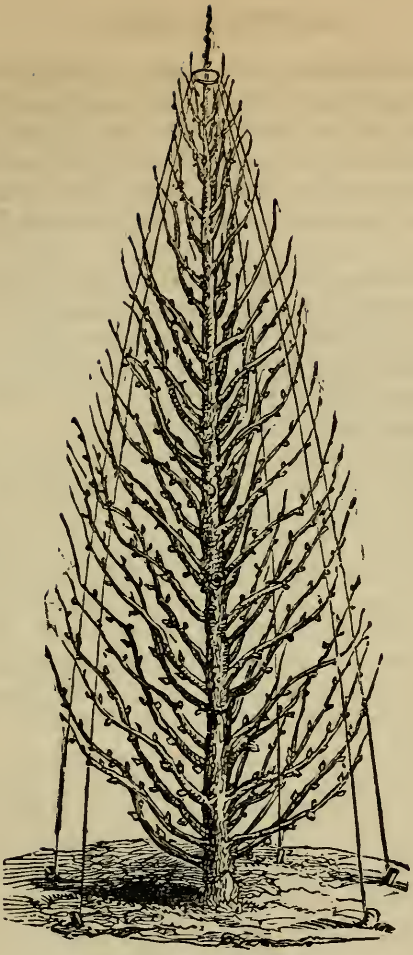


(CAPPE'S PYRAMID TREE.)

CHAPTER XV.

PLANTING, PRUNING, AND TRAINING FRUIT-TREES.

488. In selecting trees for planting, it is important to note their different seasons for ripening, and to select the sorts, so that a continuous supply may follow. There are some kinds of fruit which must be consumed when ripe, or preserved in sugar or otherwise, which altogether changes their character. Besides, only a moderate supply of apples and pears need be provided in summer or early autumn, when peaches are in season. Nevertheless, it would be a great mistake to overlook summer apples and pears altogether: many of them are of excellent quality, and form an agreeable addition to the dessert, as well as for kitchen use, even in houses well supplied with peaches, nectarines, and apricots. In arranging the quarters of the fruit-garden, therefore, leaving

the walls for the more tender peach, nectarine, apricot, and more delicate French pears, the espaliers, dwarf trees, and pyramids, might be arranged so that out of every hundred trees, whether pears or apples, a tenth might ripen early, a fifth ripen in October, a fifth in December, and the remainder —long-keeping sorts—ripening in the winter. This proportion might probably extend to the largest establishments, and even to the orchards of the cider counties, where the system we are now describing might be acted upon with great advantage to the owners. In smaller gardens, with which we have more immediately to do, the proportion of apples, pears, and plums, will be decided by individual taste. If we were to offer an opinion on this point, it would probably be to divide the garden, one half, or thereabouts, into apples and pears; and to plant the outside of the wall borders next the walks with espaliers, for apples and pears of the finer sorts.

489. The season for planting may be any month from October to March; but many arguments may be brought forward in favour of the month of November, if the weather be open and free from frosts. Spring is always a busy season in the garden; digging, sowing, grafting, and pruning, are then in full operation, "And why should planting be added to the number?" asks the Rev. Mr. Lawrence. "It makes part of the wise man's pleasure and diversion to have always something to do, and never too much. Amusements and recreations of all kinds should come to us in regular and orderly succession, and not in a crowd; besides, some intervals of time for meditation between different kinds of work in a garden are very desirable to a good and thoughtful man."

490. The Pear loves a silicious earth, of considerable depth; plums flourish in calcareous soils, and the roots seek the surface; the cherry prefers a light silicious soil; and all cease to be productive in moist, humid soils. The apple accommodates itself more to clayey soils, but does best in a loamy soil of moderate quality, slightly gravelly. In preparing stations, therefore, suitable soils should be supplied to each. The station is prepared by digging out a pit about three feet square, and the same depth, in ground that has been well drained. In the bottom of this pit lay 10 or 12 inches of brick or lime rubbish, the roughest material at the bottom, and ram it pretty firmly, so as to be impervious to the tap-root: the remainder of the pit is filled in with earth suitable to the requirements of the tree. When the surrounding soil is a tenacious clay, the roots of the young tree should be spread out just under the surface, and rich light mould placed over them, forming a little mound round the roots; but in no case should the crown be more than covered: deep planting is the bane of fruit-trees.

491. The stations being prepared, and the trees having arrived, it is necessary to prune the roots, by taking off all the small fibres, and shortening the larger roots to about six inches from the stem; and if they have received any bruise before reaching you, that part of the root should be removed entirely, by a clean sharp cut. Two or three spurs are sufficient; but if there be more good ones, they may remain, after being carefully pruned. The

rapidity of railway conveyance will prevent the trees from injury, especially if they are carefully packed in mould, and matted; but it may be a proper precaution against carelessness at the nursery, if the roots are laid in milk-and-water or soap-suds, a few hours before they are planted. The process of planting will differ, according as it is intended to be a dwarf, a standard, a pyramid, or a wall tree. If for a dwarf, standard, or espalier, place it upright in the centre of the station; spread the roots carefully in an horizontal direction, and cover them with prepared mould to the required height, supporting the young plant with a strong stake, driven firmly into the ground, and tying the stem to it with hay, or some other string that will not bruise the young tree, pressing the soil gently, but firmly, over the extended roots, after cutting away the tap-root, except in the case of the peach, which, having a tendency to throw up suckers, should have the roots directed downwards, having first laid a layer of half-rotten dung all round the tree. This process, called mulching, consists in spreading a layer of short half-rotten dung five or six inches thick round the stem, in a radius six inches beyond the extremity of the roots; the mulch spread evenly with the fork, and gently pressed down by the back of the spade, or, if exposed to wind, pegged down to prevent its being blown away. If a wall-tree, let the root be as far from the wall as may conveniently be, with the stem sloping to it, the roots being extended and covered in the same manner, with the soil.

492. The nature of the soil is to be regarded, and the tree planted at a greater or smaller elevation above the level of the surrounding soil, according to its nature: where the sub-soil is a stiff clay, the mound in which it is planted should rise from nine to twelve inches; in a warm dry soil, a very gentle elevation suffices. The roots should be planted in the richest mould; and various expedients, to which we shall presently refer, are used to keep them moist and cool, and free from canker. The mould requires to be pressed gently and closely round the roots with the hand, so that the soil may be closely packed round them: with these precautions, no fear need be entertained of productive fruit-trees being obtained.

493. And now, your trees being planted, the wall-trees nailed to the wall to prevent their being shaken by the winds, the standard and dwarf trees firmly attached to a strong stake for the same purpose, let us consider the various expedients which have been adopted, from time to time, to protect the roots of the young trees from the frosts of winter and the scorching heats of summer. For this purpose, layers of straw, or of ferns, five or six inches thick, laid in circles three feet round the stem, have been recommended, and the nurseryman should have very special directions to have them carefully taken up, with every root and fibre as entire as possible, carefully packed in damp moss, or other material that will retain moisture, the stems and branches well tied in, and wrapped up in straw inside and mats outside. On their arrival, if the weather continues open, they are to be carefully unpacked, and "laid in by the heels," as gardeners term the operation of laying them in a temporary trench.

494. The reverend author we have so often quoted very much approves of the ferns and mulching during violent frosts; but the straw and dung, he thinks, encourage worms, ants, and other vermin very injurious to the young roots; therefore he adopted, as equally effective, more sightly, and free from that objection, the plan of placing a layer of sand in a circle round the tree, paving it with small round stones, which is neat and attractive to the eye, and equally effective in protecting the roots, keeping them, at the same time, cool, and admitting of the necessary percolation of moisture.

495. The principles of physiology, briefly sketched in a former page, are applied to the pruning of fruit-trees, with the following results:—

1. It imposes on the tree a form in keeping with the place it is intended to occupy.
2. It leads to the principal branches of the tree being furnished with fruiting-branches in all its extent.
3. It renders the fructification more equal, by suppressing superabundant flower-buds, and encouraging new ones for the following year.
4. It determines the production of larger fruit, and of better quality, by regulating the supply of nourishment to the fruit-bearing branches.

496. In fruit-trees in a state of nature the sap is distributed equally, because the tree follows its natural tendency, which is to develop perpendicular branches; and as the tendency of the sap is to ascend to the loftier branches, the ramifications of the base of the stem come to languish, and finally dry up altogether into hard wood; it is, therefore, indispensable to the production of fruit, to overcome this natural tendency of the sap. Let us imagine an espalier-trained tree in which the equilibrium of vegetation is broken; we know that the sap is attracted by the leaves, and that by suppressing a sufficient number of the leaf-buds upon the branches, growing with superfluous vigour, the sap flowing into them will be diminished, and an increased quantity will fall to the weaker branches, whose leaves are kept untouched; therefore suppress, as early as possible, all useless buds on strong branches, and retain them as long as possible on weak ones.

497. The sap acts with greatest force upon the shoots thrown out by vertical branches; weak branches will be assisted, therefore, by being placed in a vertical position, and strong ones repressed by being trained horizontally, or by having their extremities arched downwards.

498. In removing the leaves from a strong shoot, in order to restore the balance to a weak one, it is necessary to remember, that without a due proportion of leaves to attract and elaborate the sap, the branch will perish; the leaves removed, therefore, must be sufficient to restore the equilibrium, and no more; and they must be removed in such a manner as to preserve the petiole, or leaf-stalk, on the branch.

499. Fruit has the property of attracting sap, and elaborating it for its increase; and it follows, that a superabundance of sap will be drawn to the

stronger branches. Leave all the fruit possible on the strong, and suppress them upon the weaker branches.

500. A solution of sulphate of iron, in the proportion of one grain to a pint of water, applied after sunset to the green leaves and leaf-buds of weak branches, is rapidly absorbed by the leaves, and powerfully stimulates their action upon the ascending root-sap of fruit-trees.

501. By detaching weak branches from the wall or espalier to which they are fixed, they receive an increased amount of light and air on both sides. As light is the chief agent employed in the elaboration of the sap, its energy will thus be largely increased. But this must not be done until the end of May when any danger from frosts may be considered as past. The same result is obtained by covering the stronger branches from the light.

502. The sap develops itself much more vigorously under short pruning than under long branches. If, then, it is desired to obtain wood-branches, prune short: when the branches are vigorous they develop few flower-buds. On the contrary, if it is desired to develop fruit-bearing branches, prune long; the less vigorous branches develop abundance of flower-buds. Another application of this principle, to re-establish the vigour of a tree exhausted by a heavy crop, is to prune it short the following year. This may appear to be a contradiction of a maxim previously laid down, to prune short an over-vigorous branch and leave the weak ones long. The contradiction is only apparent; the one applies to a whole tree, which is to be treated alike in all its parts; the other to a tree whose equilibrium is to be restored,—the one to the production of wood, the other of fruit.

503. The tendency of sap to flow to the extremity of the branch leads to a more vigorous development of the terminal bud than of the lateral buds; accordingly, where it is desired to obtain an elongation of the branch, it is necessary to prune back to a vigorous wood-bud, and to leave none beyond it which can interfere with the action of the sap.

504. *The more* the sap is retarded in its circulation, the smaller is the force with which it acts in developing branches, and the greater its action in producing *flower-buds*. Trees only begin to develop flower-buds when they have reached some maturity; for their production it is necessary that the sap should have attained some consistency, and circulate slowly. This elaboration is assisted by the extended course it has to run in the lengthened branches; it is also assisted by broken and interrupted lines. This well-known principle has been taken advantage of to check the sap by pinching and torsion, and even partially breaking over-vigorous branches. These mutilations have been found to diminish the vigour of the shoots and branches, by forcing the sap into new branches while the older branches are elaborating their fruit-buds.

505. When all other methods of checking the superfluous vigour of a tree fail, late winter-pruning is sometimes practised, when the shoots have attained a length of one-eighth of an inch, when the sap has already reached the summit of the branches, and the buds near the base push less vigorously.

Another expedient is to apply side-grafts to the branches, the grafts being fruiting-buds. When they blossom and fructify, the fruit absorbs the superabundant sap of the tree: this, however, is only applicable to the apple and pear, and other pip-fruit.

506. In the case of pyramid trees, the vigour of the tree is diminished by arching all the branches, so that their extremities are directed to the ground; this is done by surrounding them with a cord, pegged down a short distance from the ground, and attaching the tips of all the branches to it.

507. Root-pruning is a never-failing remedy for over-luxuriance; but the remedy is a severe one, and it may be doubted if it should be lightly performed. A less violent mode of treating the roots is sometimes tried with advantage: the soil is removed from one entire side of the tree, and the roots laid bare, and left exposed during the summer to the effects of air and light. This has the effect of diminishing the vigour of the tree, and throws it into bearing; or, if it fails, the same treatment pursued in the following spring will probably be effectual. Should it fail, root-pruning must be had recourse to: this is performed by digging a trench round the tree so as to keep clear of all the roots, at the same time laying them all open. With a sharp knife or saw, or chisel if necessary, cut away a considerable portion of the larger roots, and trim all the small ones, leaving them all sound and properly trimmed, replacing the soil, after adding to it what is required.

508. Transplanting is another remedy recommended for over-luxuriant growth; it is, however, only applicable to young or dwarf trees. It is performed in autumn; the roots being trimmed and shortened, and the tree carefully replanted in a suitably-prepared station. The check is usually followed by an ample abundance of fruit-buds the following year.

509. The process of pruning fruit-trees is performed at two seasons—winter and summer. Winter pruning should be performed while vegetation is entirely at rest,—the period which follows the severest frosts, and which precedes the first movement of vegetation, that is to say, the end of February or the very beginning of March, in ordinary years. If trees are pruned before the strong frosts of winter set in, the cut part is exposed to the influence of the severe weather long before the first movement of the sap takes place, which is so necessary to cicatrize the wound, and the terminal bud is consequently often destroyed. Equally troublesome are the wounds made during frosts: the frozen wood is cut with difficulty; sometimes the cut is ragged, and they do not heal; mortality attacks the bud, and it disappears. To prune after vegetation has commenced, except where summer pruning is to be pursued, is not to be thought of; therefore let it be done in February, if the frost has disappeared, more especially for the peach, whose buds placed at the base of last year's shoots, are particularly exposed to the action of the ascending sap. Summer pruning will be best treated of under the particular species, each of which require to be attended to at different periods.

510. The instruments required in pruning are a hand-saw, a pruning-knife, a chisel, and a mallet. For garden trees the knife is the most important:

it should be strong and of the best steel, with a considerable curve, so as to take a good hold of the wood. The manner of operating is far from indifferent. The amputation should be made as near as possible to the bud, but without touching it; the cut should begin on the opposite side, and on a level with its lower part, made at an angle of 45°, and terminate just above the bud.

511. If it is necessary to cut away a branch altogether, a small portion of it should be left on the stem, and the cut should be a smooth and bevelled one, presenting the smallest possible extent of wounded surface. If made with the saw, it should be made smooth with the knife or chisel, and covered with grafting-paste.

512. The first object in pruning a standard tree is the formation of its head. The first pruning must take place at the end of the first season after grafting, when the scion has made its growth, as represented in fig. 1, when two shoots have sprung from the graft. To form a full round head, the two shoots should be pruned in to *a*, *a*. The year after the tree will present the appearance represented in fig. 2; or, if three shoots have been left the first year, and the whole three headed in, in the following year they will appear as in fig. 3, each shoot having thrown out two new branches. The one tree now presents a head of six, and the other four shoots. At the end of the second year both are to be headed back, the one to the shape indicated by the crossing lines *a*, *a*, *a*, *a*, the other as nearly as possible to the same distance from the graft.

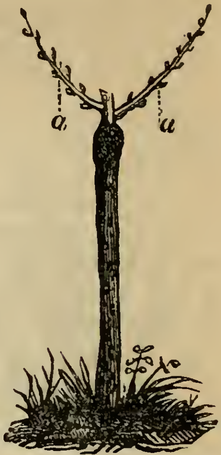


Fig. 1.

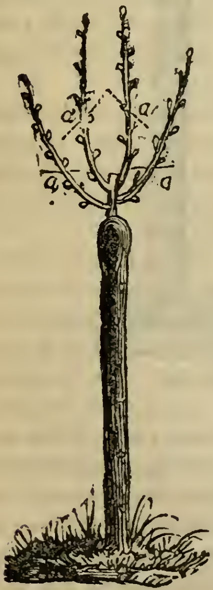


Fig. 2.

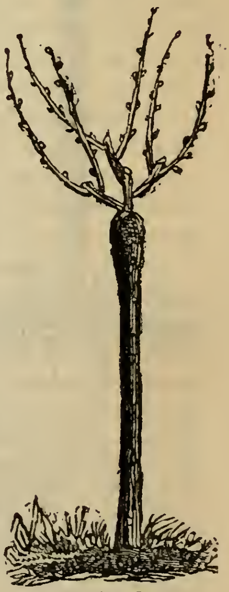


Fig. 3.

513. Another year's growth will, in each instance, double the number of main shoots, which are now eight and six respectively, as represented in fig. 5. If a greater number of shoots appear, or if any of them seem badly placed, their growth should be prevented by pinching off the tops when young, and pruning them clean off when the tree has shed its leaves. The time for

pruning is any of the winter months between November and February, before the sap begins to stir. Those trees which have produced six shoots should be pruned exactly like those with eight, to form a compact head, as in fig. 4; and when the standard tree has acquired eight main branches by these various prunings, it has attained its full formation, as represented in fig. 5, where they have assumed a circular cup-like form. For a few years, the growth of these eight branches should be carefully watched, and each kept as nearly as possible in an equally vigorous state. Should any of them take the lead of the others, so as to threaten the symmetry of the tree, its extremity should be nipped off in such a manner as to check its growth, and at the winter pruning it should be shortened in considerably. All shoots from the stem below the grafts should be rubbed off as soon as they appear.

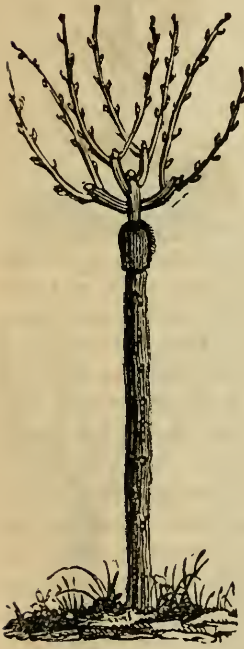


Fig. 4.

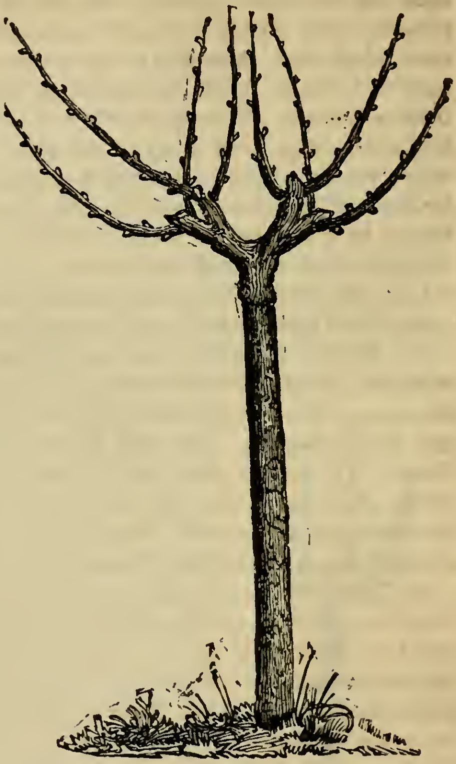


Fig. 5.

514. When the standard tree has reached its bearing state, the object of the pruner is the production of fruit, which is best attained by giving a round and cup-like form to the tree. If the branches are too rigorously shortened, strong useless wood will be produced, without fruiting-spurs. If the branches are well placed, let them have their free course, and they will throw out

bearing-spurs to the extremity of the branches. Little more need be said on the subject, except that all unproductive wood, crowded sprays, and decayed branches, that cross each other, should be cut out, the tree kept open in the centre, and the open cup-like form rigorously maintained. These remarks apply chiefly to apples, pears, and other trees which bear their fruit on spurs; where their habit is different, it will be noticed in treating of them specifically. These spurs will in time become long and scrubby, with many branches, as in fig. 6, where we see a spur with many branches getting further and further away from the main branch. To bring it back to its proper position, cut away, neatly, the upper shoot at *a*, and the side-shoot at *b*, cutting out, also, the central shoot, when the small bud, *c*, will push out and form blossom-buds the following year.

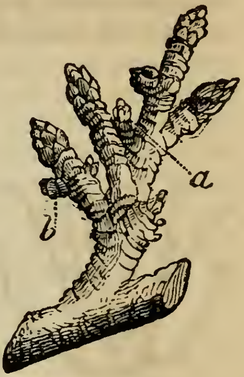


Fig. 6.

515. When a tree is very vigorous, the buds will break strongly and run into wood too strong to form blossom-buds. The remedy in this case is to break the young shoot near the third bud from the main branch, leaving the broken part hanging down. The time for this operation is about the middle of March. The broken part, while it droops, nevertheless draws up a portion of the wood-sap. The following winter, when the buds are turned into blossom-buds and become fruitful, the hanging shoot should be neatly pruned away, when a fruitful bearing-spur will be formed.

516. Root-pruning I have already adverted to: it is performed by laying bare the roots three feet from the stem of the tree; then with a sharp axe, or chisel and mallet, cut through a portion of the strongest roots, according to the requirements of the tree. If the tree is extremely vigorous, without producing fruit, two-thirds of the stronger roots cut through in this manner will probably restore the tree to a state of perfect bearing; the trench being filled up with fresh virgin mould, and the tree left at rest for a year. The proper season for root-pruning is the autumn, when the roots will send forth small fibrous spongioles, which elaborate the sap, and form blossom-buds. Should this operation fail to check the superfluous vigour of the tree, the roots may be again laid bare in the following autumn, and the remaining large roots cut away, avoiding, as much as possible, all injury to the smaller fibres which have pushed out from the previous operation. Should the tree still present an over-vigorous growth, it must be taken up entirely, and all the strong roots pruned in, then re-planted, taking care that in re-planting, the tree is raised considerably above its former level—a severe operation, but certain to be successful in reducing the tree to a fruitful state.

517. Various modes of training are in use among gardeners, but none are more graceful than the pyramidal form; and it is profitable as graceful, inasmuch as double the number of trees may be planted in the same space without crowding. This mode of training is extensively adopted in continental

orchards, chiefly with pear-trees, but it is equally applicable for apples, cherries, and plums. The form is, of course, the result of pruning, as well as training, a young tree with a single strong leader, which may be obtained at any of the nurseries, though the best and surest way would be to plant stocks where the trees are to stand, and graft them with suitable varieties for the purpose, taking care that one shoot only is allowed to spring from the graft. If they are procured from the nursery, plant them in properly-prepared stations, as already described, supported by a strong stake driven firmly into the soil, and leave them for a year, in order that the roots may have a secure hold of the soil, and send up plenty of sap when the growth commences, to push the buds strongly. We will assume that the young trees have plenty of buds nearly down to the graft; then, in the following autumn, cut off the top of the shoot at *a*, fig. 7, with a clean cut. At the end of the second year it will have made several shoots, and will probably, in many respects, resemble fig. 8; but as we still require vigorous growth, it will be necessary to cut in again severely at *a* and *b*, *b*. The summer following, the side-shoots will spring forth with great vigour, spreading on all sides; and now the first foundation of the pyramidal form is laid, by extending the shoots horizontally, and tying them firmly to stakes so placed that the range of branches forming the bottom of the pyramid should project away from the tree at nearly right angles, and at equal distances from each other. If they are too numerous, the superfluous shoots should be cut off. The third summer, if it continues in a healthy state, the tree will present the appearance of fig. 9, with this exception, that the lower branches will be more horizontal than they are here represented in consequence of being tied to the stakes. If some of the branches have grown more vigorously than others during the summer, such shoots should be pruned in to where the lines cross the branches. On the other hand, should others develop themselves feebly, they should be left at their full length, so that the descending sap, elaborated by the leaves, should deposit a larger amount of cambium. Strong shoots may also have their vigour modified by making an incision immediately below their junction

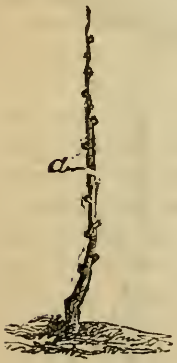


Fig. 7.

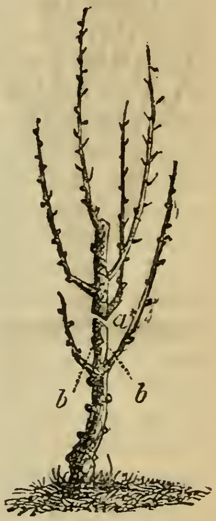


Fig. 8.

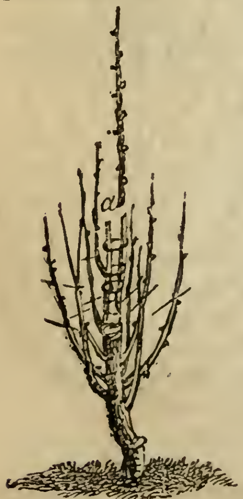


Fig. 9.

with the stem, just before the sap rises in the stem; and if a desirable bud remain dormant, it may be forced into growth by making an incision just above it. Where a large vacancy occurs between the branches, then a side-graft, in the manner illustrated at p. 128, should be inserted to fill up the space. They should again be cut at *a*, and the fourth year will present the appearance of fig. 10. It will then most likely begin to throw out fruiting-spurs: these should be carefully encouraged, for on the number of spurs which a branch exhibits does it depend whether the tree is to bear a good show of fruit or not.

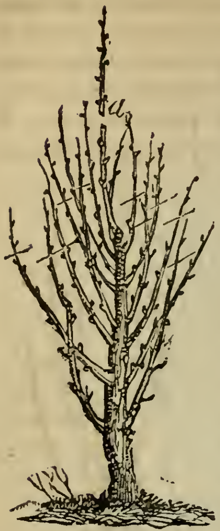


Fig. 10.

518. The tiers of branches, as they advance in height, should be regulated so that every side is furnished with an equal number of branches. In the autumn of the year the tree will resemble fig. 11. The pruning is now confined to shortening the leading shoots and the laterals where the lines cross (fig. 11) the branches. The spurs should be carefully examined, and if any of them get long and branching, prune them in, as described and illustrated in fig. 6. If any of them promise to be unfruitful, follow the method described in figs. 7 and 8.

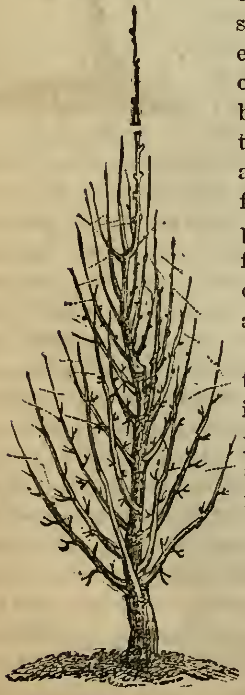


Fig. 11.

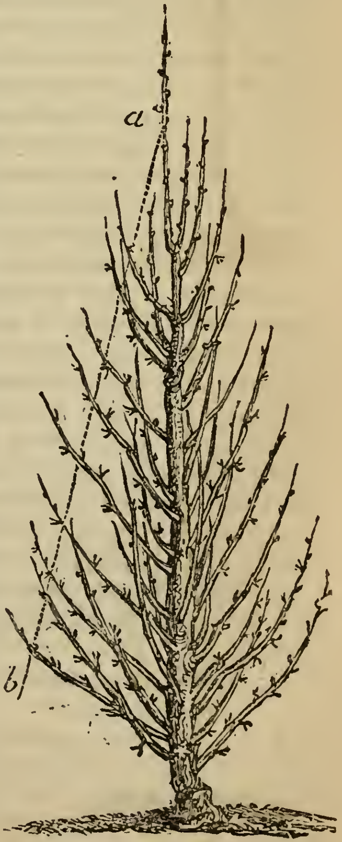


Fig. 12.

519. The fifth year the tree, continuing its progressive growth, presents the appearance of fig. 12. It is now a tree of considerable size, and requires, besides the regular annual pruning of the leading shoots and spurs, that the lateral branches should be cut in a line

as nearly as possible to that indicated between *a* and *b* in fig. 12. We see in the figure some short lateral shoots crowding towards the centre: all these, if present, should be pruned away. After this, careful pruning is all the tree requires, taking care that the lower branches are not shaded by the upper ones, which is attained by pruning them at greater length than those above; for it is one of the great principles on which this mode of training has been advocated, that the trees should be so managed that the advancing tier of branches shall not interfere with the swelling and ripening of the fruit on the lower tier by overshading them. During every summer all superfluous shoots should be rubbed off as they appear, and all strong shoots in the spurs should also be stopped during that season, in order to insure vigorous action in the remaining buds, while the base of the pyramid is to be extended as far as is consistent with the development of fruit-bearing habits: and this will probably be best attained by making it a rule, that as soon as a shoot has extended from eight to ten inches, the point should be cut. By this practice the more powerful shoots are checked and the weaker shoots encouraged. The advantages derived from this system of training may be stated as follows:—

1. An increased number of trees in the same space.
2. The trainer has his trees more directly under control.
3. Increase of crops.
4. Ornamental and uniform appearance.

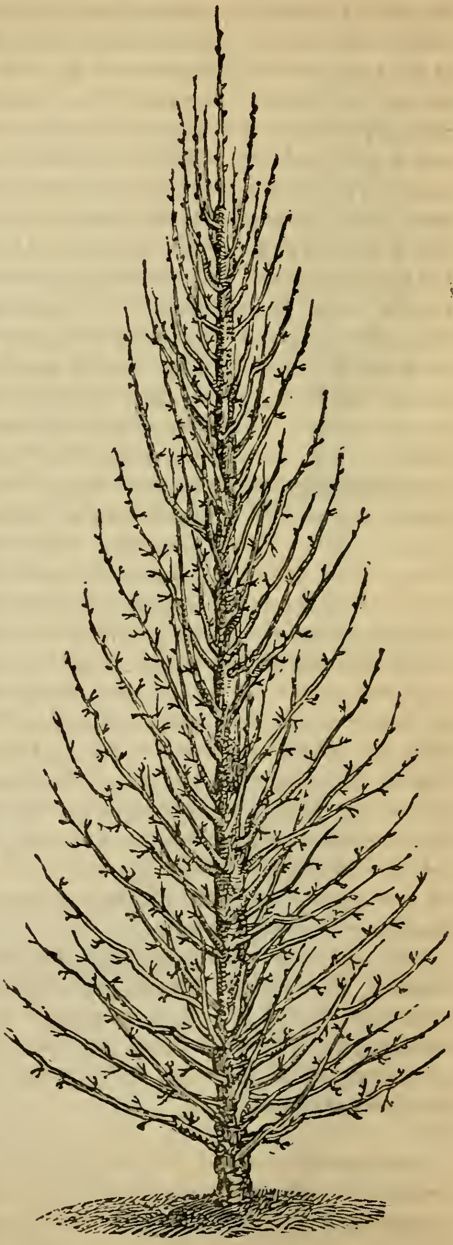


Fig. 13.

520. Some years ago, M. Cappe, a gentleman of very great experience in the management of fruit-trees, and curator of the gardens belonging to the Museum of Natural History in Paris, devised a modification of the pyramidal form, which secures a more complete diffusion of light and air in the interior of the trees, causing the centre of the tree to be more fruitful, and the fruit to ripen and colour more perfectly. He terms it the winged pyramid, and certainly a tree so managed exhibits the highest skill in pruning and training, and is, independently of its fruit-bearing qualities, a most beautiful object. In adopting this system of training, a long pole of oak, or some other imperishable wood, some thirty feet in length, and charred at the lower extremity for about four feet, is employed. The charred end is driven firmly into the soil, close to the stem of the tree. At the upper extremity of the pole is fixed a strong iron ring or hoop, perforated with five holes equidistant from each other; five strong stumps of oak, charred like the pole, are driven into the earth, at spots corresponding with the holes in the hoop, the tops being four inches above the ground, and having a strong staple attached to them. Five iron rods with hooks are attached to the staples at one end, and to the holes in the hoops at the other: this is the framework of the winged pyramidal tree. These preparations being completed, the tree is planted in the soil, and on a station previously prepared for it, and pruned annually, so as to produce lateral branches in the manner already described. The branches are to be trained in right lines, slightly rising at the points towards the iron rods. It is evident that there will be regulated lines or openings between each of the five rods, into which light and air penetrate without obstruction, the openings also enabling the operator to reach every part of the tree with great facility; for the radiating branches should not be too close together in trees trained in this manner: 20 inches would be a proper distance, though that would greatly depend upon the habit of the tree. In one of vigorous growth, that distance would not be too great; but for one of delicate growth 16 inches would probably be better. In the cut at the head of this chapter we have a tree trained by this ingenious method, which exhibits at once the form, and the means by which it has been attained. In reducing it to this shape, the various points of pruning and training, which are identical with those already described, must be rigorously followed.

521. Any large and straight tree that has been allowed to grow in a wild manner, may, by grafting, be converted into the pyramidal form, like that illustrated in fig. 13. By a process of this kind, following the directions already given for side-grafting, fine new varieties of fruit may be raised in a comparatively short period, and a comparatively lifeless tree converted into an object of great beauty.

522. Another method of training the pear-tree, which has obtained some reputation with our French neighbours, was first practised by M. Verrier, chief gardener at Saulsaye, by whose name it is known. The tree is subjected to this training when it has attained a central stem and two lateral branches, as

in fig. 14. In the autumn or winter pruning of the following year, the two side-branches are trained horizontally, as in fig. 15, and pruned back to about two-thirds of their length, with a bud immediately below the cut. The stem itself is pruned back to about 18 inches above the side-branches, taking care that there are three buds immediately below the cut,—one on each side, well placed, and a third in front to continue the stem. With the fall of the leaf in the following year the tree will be as represented in fig. 16, with two horizontal shoots, a central stem, and two other untrained side-shoots. When the pruning season arrives, the same process of cutting back takes place, each of the new side-shoots being cut back to two-thirds of its length, the two lower branches to two-thirds of the year's growth, and the stem to within 18 inches of the second pair of laterals, leaving three well-placed buds immediately below, as before, to continue a third pair of side-branches and the stem. With the fifth year's growth the lower side-branches will have attained as much horizontal extension on the wall or espalier as it is intended to give them. Having, therefore, nailed or tied them to the trellis, give the end of the shoot a gentle curve upwards.

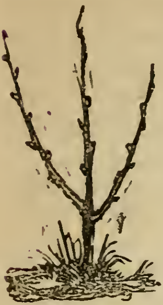


Fig. 14.

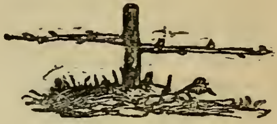


Fig. 15.

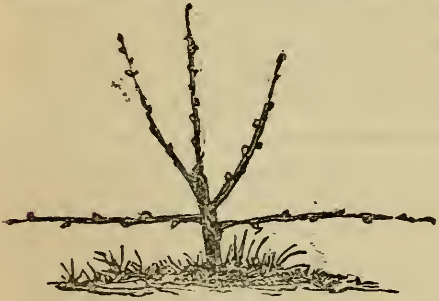


Fig. 16.

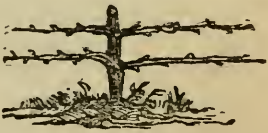


Fig. 17.

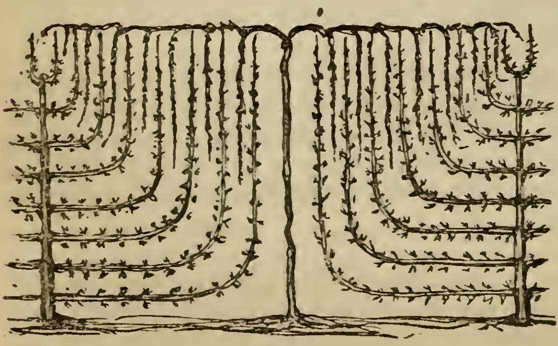


Fig. 18.

523. Continuing this annual process of cutting back after each year's growth, in some eleven years from the graft the tree will have covered a wall 12 or 14 feet high and 6 feet on each side of the stem; each side-shoot, when it is within 18 inches of the one immediately below it, receiving an upward direction, until the tree is as here shown. The stem, as

well as the side-shoots, having reached the top of the wall, the extremities of the branches are pruned back every year to about 18 inches below the coping, in order to leave room for the development of the terminal bud, which is necessary to draw the sap upwards for the nourishment of the fruit. After sixteen or eighteen years, a healthy tree, properly trained on this system, presents a surface of upwards of 60 square feet of young fruit-bearing wood. The symmetry of the tree is pleasant to look at, and it is said to be admirably balanced for vegetation, and consequently for fruit-bearing.

524. One objection to this mode of training is, that the buds do not always occur at the right spot for projecting new side-shoots. When this is the case, the process of shield-budding is had recourse to, in August. In other respects, the same principle of pruning is adopted as in pyramid-trained trees, the only modification being the removal of the spurs thrown out between the tree and the wall. Another objection to the system is the time which must elapse before the wall is covered; but this is inseparable from any mode of growing apples and pears on walls, and may be met by planting vines between each, running a central rod of the vine to the top of the wall; stopping it there for the first year, and carrying a shoot on each side under the coping, with descending rods at intervals, calculated not to interfere with the side-shoots of the pear-tree.—We may conveniently add here a section on

IMPLEMENTS AND TOOLS.

525. The tools required in a garden may be divided into implements, instruments, and tools; the former comprising the pick, spade, fork, hoe, and rake, all of which require the use of both arms, and some of them the whole muscular force of the frame. They generally combine the principle of the lever and the wedge, the blade of all of them being employed to separate particles of matter by the application of lever power, which lies in the shaft or handle. Where the handle is intended to be grasped and held firmly at one spot, as in the spade, a handle is provided adapted for that end; where the hand is to slide along, the handle should be smooth and round: such is the form of the handles of the rake, the hoe, the pick, and all similar tools; ash being the best material for handles requiring strength, willow being lighter and strong enough for others, such as the rake, the Dutch hoe, and others required to be of some length.

526. The Pick is a compound lever, the blade of which ought to be of the best wrought iron edged with steel, the handle of well-seasoned sound ash timber. It is made in various shapes; for garden use, one end is usually made pointed, the other wedge-shaped, to adapt it for cutting through roots when they are met with in the soil. That called the mattock, having the edge axe-fashion, is used to chop up hard grassy surfaces, and to stub up whins, heather, and other wild shrubs.

527. The Spade is a broad blade of plate-iron, attached to a handle of tough root-cut ash. Two-thirds of the blade ought to be of steel, and the other of the best scrap-iron, well welded together. In some, the blade is perforated

for the purpose of cleaning itself when employed on adhesive soils. The semicircular spade, used by " navvies, " is useful in hard close soils and new ground. The shovel, having a broader blade, is useful in throwing up the loose soil at the bottom of a trench.

528. The Fork, of which there are several kinds, is used for filling in dung litter and haulm, and for levelling the surface, or stirring it round the roots of plants which might be injured by using the spade. The form of the fork is generally three prongs: those used for litter, and for forking up the earth round roots of trees, have only two; but Parker's fork has five prongs, and in many cases supersedes the use of the spade. The three-pronged fork with broad tines is used for digging potatoes, and is otherwise a very useful implement in the garden.

529. The Hoe, also of many forms, which may be distinguished by its being a drawing or thrusting implement. Its use is to stir the surface of the soil and destroy weeds in their first leaves. The draw-hoe is set at the end of a long handle at an angle, so that when drawn to the operator, it sinks also into the soil. In the other, generally termed the Dutch hoe, he thrusts it from the angle formed by the height of the hands from the ground, carrying it gently into the surface of the soil. This is used where the weeds are merely destroyed and left in the soil.

530. The Rake, a row of small tines inserted in a bar of iron from six to eighteen inches long, and fixed by a socket placed at right angles to the bar, to a handle five or six feet long. This is a most important implement to the gardener, being used to rake his beds smooth and trim, and to remove loose weeds. It is also used in raking the lawn before rolling.

531. The other requisites in a garden are, more properly, instruments of operation and direction. The common garden-knife consists of a blade of prepared steel, fixed in a handle of horn or bone, without a joint, and carried in a sheath. It generally has a hooked blade, and is used for cutting cabbages and other vegetables, trimming the roots of turnips, and similar purposes, and in pruning gooseberries and other bush-fruit.

532. The Pruning-knife has the blade quite straight on the cutting side: it may be either with or without a joint.

533. The Grafting-knife has a thinner and narrower blade, and is generally made with a folding joint.

534. The Budding-knife has the sharp edge of the blade rounded off, backwards; while the handle, of bone or ivory, is brought to a fine point at the end opposite the blade, so as to form a spatula for lifting up the bark of the stock for the insertion of the bud. Goodsall's budding-knife has a heart-shaped termination to the handle, which is found more convenient for lifting the bark.

535. The Grafting-saw.—This has a blade of steel with double teeth, so that it may pass through green wood without choking up. For larger branches the forest-saw, having a handle six or eight feet long, is used to enable the operator to reach the loftier branches. When this instrument is used, the end

left on the tree must be smoothed with the chisel or pruning-knife, and the wounds covered with some composition which will exclude the air.

536. The Chisel.—There are two sorts in use,—the garden and the forest chisel: the first is chiefly used in grafting, and differs from the carpenter's chisel in being wedge-shaped, or bevelled on the edge on both sides; thus tapering to a central point. It is used with a mallet, to slit stocks for grafting when they are too large for the grafting-knife, and to smooth branches cut with the saw.

537. The Bill-hook: a hooked blade sharpened on both sides, with a handle about a foot long; a useful instrument for cutting away branches too thick for the knife. With a long handle and sharpened on the hooked side, it is used to cut hedges, in place of clipping them.

538. The Axe is a steel wedge, attached at right angles to a strong handle of ash timber, about two feet and a half long. The axe varies much in form: the long and narrow one, known as the American axe, is the most useful. It is used for cutting roots of trees which cannot be conveniently reached with the saw.

539. The Scythe: a long blade of steel, attached to the end of a crooked wooden handle. Boyd's scythe is much used in gardens where the grass is kept under by mowing.

540. Shears of various kinds are in use in the garden, both for clipping hedges and dressing the edgings of the beds. The turf edges are kept smooth by using those with long handles, moving upon a single wheel: shorter shears are used for cutting box-edgings and quickset hedges.

541. The Garden-engine is of essential service in a garden where water cannot be distributed to all the garden by means of a hose.

542. With the Syringe, which is essential in the greenhouse, the garden-engine may be made to produce the nearest possible approach to a natural shower of rain, preceded by a misty dew.

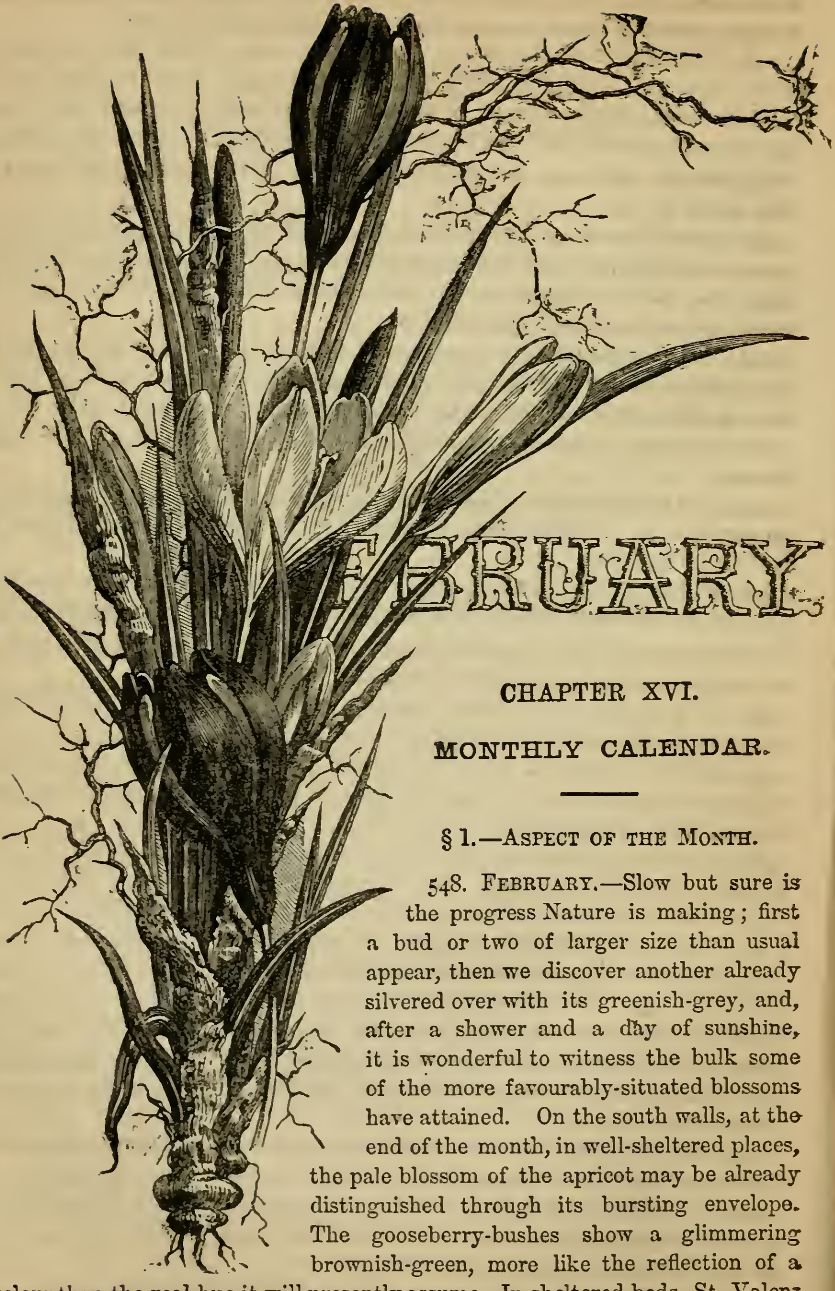
543. The Garden-line consists of an iron reel turning on a spindle, terminating in a peg and a cord. The cord is wound round the reel, and, having a peg at the other end, the beds are trimmed and the rows directed by the line.

544. The Level, as its name implies, is to guide the workman in all operations where either a perfect level, or, as in draining, a regulated fall is required. The most useful is half a square, with an iron index, marked out with ninety degrees or divisions. Where a slope is to be laid out at a perfect level, the plummet will hang in the centre, or 45°, and on a slope it may hang at any lesser number, in ascending at any higher number, according to the steepness of the slope.

545. The Measuring-rod is made of wood, generally 10 feet long and an inch square, on which the feet are marked, the last foot having the inches also.

546. The Wheelbarrow, though last is not least; indeed, it is the most indispensable implement in the garden next to the spade, hoe, and rake, and is too well known to require description.

547. The Ladder, of various sizes, will be required in the garden.



CHAPTER XVI.

MONTHLY CALENDAR.

§ 1.—Aspect of the Month.

548. February.—Slow but sure is the progress Nature is making; first a bud or two of larger size than usual appear, then we discover another already silvered over with its greenish-grey, and, after a shower and a day of sunshine, it is wonderful to witness the bulk some of the more favourably-situated blossoms have attained. On the south walls, at the end of the month, in well-sheltered places, the pale blossom of the apricot may be already distinguished through its bursting envelope. The gooseberry-bushes show a glimmering brownish-green, more like the reflection of a colour than the real hue it will presently assume. In sheltered beds, St. Valen-

tine's flower, the crocus,—blue, yellow, and white, already show themselves, and the snowdrop lifts its modest head, inducing one to ask,—

> "What impels, amid surrounding snow
> Congeal'd, the crocus's flamy bud to glow?
> Or what retards, amidst the summer's blaze,
> The autumnal bulb till pale declining days?"

549. Winter and the first dawn of spring offers the best opportunity for witnessing the rich effects produced by moss and lichens upon the trees; and even ivy-covered trees are a pleasing variety at this season, with their gaudy mingling of green and orange and silvery hues, although lichens, moss, and ivy, are fatal to the hopes of fruit from the tree, and must be ruthlessly expelled from the habitat they have selected. Among the flowering shrubs, the mezereon and spurge laurel show a few flowers, the lingering Christmas rose will still appear, and some of the veronicas will now show their welcome blossoms, indicating that spring is close at hand.

550. The mean temperature of February is nearly two degrees higher than January, and the average number of frosty nights is about eleven. Less rain falls this month than in any other, and hoar-frosts at this season generally precede it.

§ 2.—OPERATIONS IN THE FLOWER-GARDEN AND SHRUBBERY.

551. This has been called the reviving month, but it is best when its vivifying influence is confined to the roots of plants, as a mild February is often the precursor of a fruitless, flowerless summer. No matter, then, if our favourites are arrested in their efforts to grow by the hard granite-like grip of the frost, or hidden from view beneath a fleecy covering of snow. If we cannot see them, we know that they are safe, and are compensated for their absence by the spiritual-like beauty, grace, and grandeur, of every twig, laden with its pure white covering of snow, or silvered over with a frost-work of glittering glory. As the sun rises on such scenes—

> "Every shrub and every blade of grass,
> And every pointed thorn seem wrought in glass;
> In pearls and rubies rich the hawthorns show,
> While through the ice the holly-berries glow."

Gratitude and admiration of the beauty within our reach will be the best preparation for hard work when labour becomes possible, and for appreciating the beauty of the flowers, as they awake and come forth from their winter's sleep. How varied the period and diverse the circumstances of their appearing. No month so bleak, but some flowers enwreath it with beauty; no blast so harsh and keen, but it is tempered with the odour of some living plant. The flowers of winter and spring, if not so numerous, are as pure and sweet as those of June; they encircle the year with an unbroken girdle of glory, and become ministering angels of floral beauty, to teach us the great lesson, that duty, well performed, imparts dignity to the lowest station, and perfumes the character with the essence, and adorns it with the grandeur of virtue. The snowdrop and the violet heave no sigh of regret that they are born of the tempest and the storm; but the one cheerily waves its tiny silver bells, and the other joyously diffuses its fragrance, however bleak and sombre the heavens and the earth may be. Sublime lesson this to every possessor of a garden. Our very anxiety about our plants often generates a discontented grumbling spirit. The flowers themselves make the best possible use of every favourable circumstance, and patiently bide their time. Precisely on this principle and in this spirit should we endeavour to minister to their wants. We can neither supersede nor unduly assist nature with impunity. Those most intimately acquainted with the marvellous perfection of the laws that govern vegetable life and growth, feel most acutely how little there is left for man to do in the matter. The chief merit of the best horticulturists is that their practice is in harmony with this great principle, and that they *do this little well.* But ignorant, self-inflated officiousness is as disastrous in the vegetable kingdom as it is in the domain of social, moral, or religious life. Plants are not so much things *to be done for* as many imagine. Surround them with accompaniments in harmony with their natural constitutions, and they will invariably do best *for themselves.* Hardy plants require proper food, space, shelter, and training; tender plants, in addition to all these, demand a congenial, suitable climate. Within such spheres man may work; beyond them he has no power. Of course this remark is only applicable to plants in actual existence, and has no reference to the influence of man in originating new species and varieties; but even in the matters here indicated man must act with caution and judgment, and never assume the right of a despotic sovereign. Plants will obey no mandates but those in harmony with the principles of their constitution; they will suffer martyrdom rather than submit to mere arbitrary authority: hence the importance of a personal knowledge of their nature and wants in order to their proper management. The fact that there is no general code of constitutional law applicable to the whole vegetable kingdom, renders the acquisition of the necessary knowledge a work of great difficulty. Almost every distinct family of plants has its special and individual peculiarities of constitution, demanding for it special treatment. Notwithstanding all the gardening-books that have been written, there is not yet any royal road to a knowledge of vegetable life.

552. The laws that govern it are written on the structure and habits of the plants themselves, and can only be deciphered by constant close observation. Hence, all who would successfully rule over plants must first become their servants. We can only conquer Nature by obeying her. Before understanding her hidden mysteries ourselves, or teaching them to others, we must first sit at her feet and learn of her. This instruction is certain, if we come with a humble spirit; for it is emphatically true that these things are hidden from the wise and revealed to babes of a teachable disposition. Such works as this are not designed to supersede, but encourage such studies; for, while the practical instructions here given will be found to be in harmony with the

nature and constitution of the various plants, and will therefore bring them to the highest perfection, it would be an additional pleasure to every cultivator to understand the principles to which he owed his success. It would be almost impossible to over-estimate the moral benefit to be derived from such studies, for the mysterious developments and marvellous adaptations of vegetable life are specially calculated to fill the mind with love and gratitude to Him who has condescended to be known as the "Rose of Sharon and the Lily of the Valley."

553. *Rose-garden.*—November is the best month in the whole year for planting all hardy roses. I therefore prefer giving a full monograph of their culture at that period. Presuming, however, that some readers may wish to plant roses now, I will give a few hints and a list of some of the best varieties for their guidance. For nearly all roses, the soil can scarcely be too rich. They delight in a stiff loam, liberally incorporated with manure; no excellences of variety, climate, or culture, can compensate for the absence of this indispensable desideratum. In choosing standard roses, see that the stems are healthy, of a brownish colour, and proportioned in size and strength to the head they have to support. The junction of the bud with the stock should be carefully examined, to see that the union is complete and strong, and the wound healed. Unless for special purposes, never choose a standard more than three feet in height; generally, the taller the stems are the more unsightly the trees appear, and the greater the chance of their dying. No taste can well be more grotesque, inconvenient, and barbarous, than working roses on poles from 5 to 8 feet high. The only exceptions are Noisette and other climbing or drooping roses, trained down on umbrella-trellises, or as pyramids. It has also been suggested, that by careful and patient training, roses might be grown to the size and form of the weeping ash, having the branches produced from the top of a single stem, and drooping downwards. Tall trees in this form would have an elegant and graceful appearance. Half-standards of other varieties, from 18 inches to 2 feet high, are perhaps the most effective. For massing and grouping in beds, nothing answers so well as dwarfs. Dwarf roses also continue for a longer period in health than any other form; and, although they have not been so fashionable of late years, I still think a rose-garden of dwarfs as beautiful and interesting as one filled with standards. For the sake of variety, it is best to introduce both. From 2 to 6 feet will be proper distances to place roses apart; the lesser distance for weak growers, and the greater for the very strongest. About a yard apart will be a good distance for most of the perpetuals: these distances apply to roses planted on beds. Where single plants are inserted in rows, on the turf by the sides of walks, they should never be nearer together than from 9 to 12 feet; their distance from the gravel may range from 4 to 8 feet. Of all the varieties of the rose, the hybrid perpetuals are the most useful; they equal the best summer roses in size, colour, consistence, and perfume, and possess the additional charm of furnishing a succession of bloom. The following are first-rate hybrid perpetual roses:—

Auguste Mie,—large pink, good shape, beautiful.
Anna de Diesbach,—very large, bright rose-colour.
Alexandre Breton,—fine form, red, shaded with crimson.
Alphonse de Lamartine,—perfect form, delicate rose-colour.
Admiral Nelson,—round form, large and showy, bright carmine.
Baronne Prevost,—one of the oldest, best, and largest, rose-colour.
Belle de Bourg la Reine,—fine form, large and full, satin rose.
Colonel de Rougemont,—first-rate, very large, rose-colour.
Comte de Nauteuil,—perfect form, deep rose.
Comtesse de Chabrilland,—large, beautifully cupped, and one of the best-formed pink roses.
Caroline de Sansal,—large and double, pale blue.
Duke of Cambridge,—large, full, fine shape, bright crimson.
Duchess of Sutherland,—an excellent old pink rose.
Duchess of Norfolk,—fine rich purple, approaching to crimson.
Emperor Napoleon,—fine glossy crimson velvet.
Emperor of Morocco,—superb dark purple.
Eugène Appert,—showy brilliant crimson.
Géant des Batailles,—very showy, brilliant crimson-scarlet, one of the very best, but peculiarly subject to mildew in many localities.
General Jacqueminot, — the best rose grown. Whoever only grows one, let this be *the* one. It is a vigorous grower, a fine bloomer, and its brilliant crimson flowers, either in bud, or fully expanded, are exquisitely beautiful.
General Simpson,—bright carmine, large, and double.
Gloire de Vitry,—excellent, large, and full bright rose.
Gloire de Panthenoy, — fine form, rich crimson.
Jules Margottin,—a universal favourite, very large, and double, bright carmine.
La Reine,—an old universal favourite, immensely large, brilliant rose.
L'Etendard des Amateurs,—very full, purplish-red.
Lord Raglan,—very much like Géant des Batailles—perhaps rather a better constitution; first-rate crimson-scarlet; brilliant flower.
Louise Peronny,—magnificent, one of the very best bright pink roses.
Louis Chaix,—fine form, bright red.
Louis XIV.,—large, good, bright reddish-crimson.
Madame Furtado,—good form, full bloom, rosy carmine.
Madame Domage,—strong-growing, largest size, pink.
Madame Masson,—superb, large, vivid crimson.
Madame Place,—good form, fine pink.
Madame Standish,—fine rosy lilac.
Madame Vidot,—very double, excellent form, transparent flesh-colour.
Mrs. Rivers,—a first-rate, pale flesh, nearly white variety.
Marquise de Paris,—beautiful satin rose, the lower petals somewhat silvery.
Prince Leon,—fine form, double, bright crimson.
Pauline Lausezeur,—very double, crimson and violet.
Queen Victoria,—fine pale flesh, tinted with pink.
Souvenir de Leveson Gower,—large and double.
Sénateur Vaisse,—very large and double, dazzling crimson.
Souvenir de la Reine d'Angleterre,—large bright rose.
Triomphe d'Amiens,—large, lake, beautifully streaked with reddish-brown.
Triomphe d'Exposition,—large, reddish-crimson.
Triomphe de Paris,—beautiful, bright reddish-crimson.
Victor Trouillard,—large and full, vivid crimson,
Victor Verdier,—large and double, cherry, shaded with carmine.
William Griffiths,—excellent form, very double, lilac rose.

554. The following are good summer-roses:—

Moss.—Perhaps no variety exceeds in beauty the common moss-rose. Its large rosy blush-flowers are universally admired, and in bud it is inimitable.

555. The following are also good varieties:—

Laneii, Gloire de Mousseuses, Unique de Provence, in large white clusters, and the white Bath.

556. Of Provence roses, the red and white Cabbage, Blanchefleur, large and full, French white, and La Ville de Londres, a large showy deep rose-colour, are as good as any.

557. Hybrid Bourbons:—

Charles Lawson,—very large and double, deep rose.
Coup d'Hebe,—the most perfectly shaped and beautiful of all roses, bright flesh-pink.
Paul Ricaut,—exquisitely beautiful, large, bright crimson.

Gallica.
Boula de Nauteuil,—large, handsome, purple-violet.
Kean,—large and full, bright crimson.
Letitia,—good form, rich deep rose.
Bizarre Marbrée,—beautiful marble rose.

558. Climbing Roses:—

The white and yellow Banksian are universal favourites; and Fortune's large double white is a useful addition to this class.

559. Of Ayrshire, perhaps Queen of the Belgians, a creamy white, and Riga, a pale flesh-coloured variety, are as good as any.

560. Amadis and Inermis are also good varieties of Boursault roses.

561. Of Evergreen roses, the following are very good:—

Laure Davoust,—bright pink, changing to white.
The Garland,—white, lilac, and blue.
Félicité Perpétuelle,—creamy white.
Princesse Marie, deep reddish-pink.

562. I will give a descriptive list of some good varieties of Bourbon, Noisette, China, and tea-scented roses next month. Tender sorts of either of these varieties will be safer if planted towards the end of March or beginning of April. It is not a good practice to prune roses when planted. Planting ought to be finished as soon as possible, and the tops left on for a month or six weeks. They should then be cut back, or headed in to three or four buds from the stock. This will insure a healthy vigorous growth. After the plants are established, the shoots may vary in length, from 4 to 16 inches. The weaker the growth, the closer should they be pruned, and *vice versâ*. Established plants of hybrid perpetuals and summer roses should be pruned at once; the more tender varieties will be safer unpruned till another month or six weeks.

563. *Flower Garden.*—Where the beds are filled with shrubs in winter, they should be hoed deeply several times during the month, to expose a fresh surface to the air. Beds occupied with crocuses and snowdrops should have the surface broken with a rake occasionally, before the plants appear. Borders similarly furnished require the same treatment. This not only imparts additional neatness, but, by breaking the crust, enables the plants to appear more easily and speedily, and in dry weather it considerably modifies the power of the frost. Beds planted with herbaceous plants, as well as herbaceous borders, would be benefitted by similar treatment, provided they were dug early in November. Finish digging among herbaceous plants, circumscribing, dividing, rearranging, and replanting all where necessary, during mild weather. The old-fashioned way of arranging these according to their height is still the most effective. The modern bedding system has well-nigh banished herbaceous plants from our gardens: nevertheless many of them are very beautiful, and a collection containing Phlox, Asters, Campanula, Delphinium, Aconitum, Pentstemon, Helleborus, Aquilegia, Cheiranthus, Gentiana, Iberis, Lathyrus, Lupinus, Monardia, Pæonia, Potentilla, Primula, Salvia, Saxifrage, Sedum, Silene, Spiræa, Iris, Statice, Chelone, Lychnis, Alyssum, Acanthus, Fraxinella,

Achillea, Orobus, Yucca, Scabiosa, Œnothera, Dianthus, Dyletra, Veronicas, Myosotis, Sachys, &c. &c., arranged according to their height, colour, and time of flowering, and intermixed with bulbous-rooted plants, such as the Crocus, Narcissus, Hyacinths, Cyclamen, Oxalis, Tulips, Ornithogalum, Scilla, Fritillaria, Lilium, Cypripedium, Gladiolus, Allium, Anemone, Ranunculus, Galanthus, Tritonia, Orchis, Colchicum, Pancratum, and Tigridia, would make a very fine display.

564. Most herbaceous plants are easily increased, either by dividing the roots, by offsets, by cuttings from the side-shoots or roots, and by seeds. Many of them, from their rapid growth, require taking up and dividing every second year. To insure good flowers, a few strong stems of such plants as Phloxes, Asters, &c., must be secured, in preference to a multiplicity of smaller ones. Consequently, they require frequent and severe subdividing; from this to the month of April being the best period for performing this operation. Others, again, such as Gentians, Iberis, Alyssums, Achilleas, and other similar flowering plants, thrive best without being often disturbed, and must be increased by small-rooted offsets. These should be planted in the reserve garden for the ensuing summer, and transferred to their flowering quarters this time next year. Double rockets, scarlet lychnis, hollyhocks, and other double-flowering plants, are often increased by cuttings. These can generally be obtained either by thinning the young shoots in the spring, or by securing all that appear at the bottom of the flowering-stems in the autumn. At either period they should be inserted in sandy soil, covered with a handor bell-glass, and receive a gentle warmth until rooted. If inserted in the spring, they will of course be transferred to the reserve garden as soon as the rooting and gradual hardening processes are completed. If this is done in the autumn, they will be safer under shelter until the end of April. In either case, with liberal treatment, they may flower the next summer. To induce autumn-struck cuttings to do this, however, they must be potted off in rich soil as soon as rooted, into separate pots, and receive the stimulus of a genial atmosphere and shelter from the weather. All the mints, galiums, and other plants with running or creeping roots, are so easily and obviously increased as to require no instructions.

565. All single-flowering herbaceous plants may also be increased readily by seed. They may either be sown as soon as ripe, or after September in pots; if before that period, in the reserve garden. If sown this or next month, on beds of light soil, and the plants carefully transplanted two or three times during the summer, they may be transferred to their blooming quarters next November; if they have been properly treated, they will flower profusely the following season.

566. The grand feature in the culture of bulbous-rooted plants is, that most of them, from peculiarity of constitution, or from their mode of increase, require to be taken up and replanted every year, or every second or third year at the farthest. Where this is not done, the flourishing bulbs are smothered with the quantity of small offsets that form around them. These offsets not

only rob the larger bulbs of their food, in species in which the same bulb flowers for several seasons, but by shading them from light and air, prevent the elaboration of the little that is left into organizable matter for the formation of flowers the succeeding season. In species, again, that flower only once from the same bulb, as the numerous varieties of Gladiolus and similar plants, two or more bulbs are generally formed; and if they are left where formed, a number of weak, puny, flowerless bulbs will be the consequence. Other species, like the Crocus and similar bulbs, form their young bulbs on the top of the old ones; and by this process, repeated yearly, would speedily throw the original bulb entirely out of the ground; while the Narcissus, Tulip, Colchicum, and similar plants, form their new bulbs under the old ones, and would ultimately burrow so deep that the young bulbs would never reach the surface at all. To remedy all these evils, and insure for the bulb a period of perfect rest, all the most valuable varieties should be taken up annually. No special time can be named as the best adapted for this purpose. Bulbs vary so much in the period and habit of their growth, that any general instructions would only mislead. One rule, however, which must never be infringed, is, that no bulb is to be disturbed while the leaves are in a growing state. The bulb is never matured until the leaves die of their own accord. As soon as they thus die, the bulb may be taken up and stored away in a cool room, say in a temperature of 40°.

567. The period of rest allotted for different families must also vary. To save trouble, common border bulbs are generally replanted at once: I believe, however, all of them would be benefitted by a period of perfect rest. If kept cool, the bulbs themselves will give unerring instructions concerning the right time of planting. If the store-room is too warm, their excitability will afford no criterion for safe practice. From one to three months will be a suitable resting period for most of the families. Bulbs so obviously increase themselves, either by the formation of young bulbs, above, below, or beside the old ones, that any instructions concerning their propagation would be well-nigh superfluous.

568. The great business of propagating tender plants for furnishing the flower-garden must now be vigorously prosecuted. Stock must be taken; calculations made, judgment and foresight exercised, and activity displayed, if the garden is to be liberally filled next May. For the last few months, the great object has been safely to keep what we have. During the next three, the plants we have must be used to furnish what is required to fill the garden next May. If the bedding system is to maintain its ground, the garden must be filled with *flowering plants* by the end of that month. To effect it, verbenas must be planted 4 inches apart, and geraniums from 6 to 8 inches. Measure the superficies of your beds; calculate at these distances, and increase your stock accordingly. With the exception of calceolarias certainly, and probably geraniums, nearly all other bedding plants grow and flower as well, if not better, when propagated in the spring as in the autumn. Geraniums grow equally well; but I think autumn-struck cuttings flower more freely, and cer-

tainly two, three, or four-year-old plants flower more freely than any cuttings whatever. Boxes of geranium-roots that have been stored in cellars through the winter, may now be brought out into the light of day, and, if they have been carefully managed, the whole surface will be alive with buds and shoots. A hundred such roots will furnish a thousand well-rooted plants before bedding-out time, and leave the old roots still available—the best of all plants for the centres of beds. For this purpose, however, they must be placed in bottom-heat until the shoots are two or three inches long. Then thin the *stools* by heeling off the cuttings; that is, taking them off quite close to the old stems. Place the cuttings singly in small 60-sized pots, or three round a large 60; or in pots or boxes of any size: place them in a house or frame with a temperature of 60°, and in three weeks they will be well rooted. If a frame is used, it must have a little air night and day, as geraniums are very impatient of a close atmosphere. For several years past, I have used a house for this purpose in which cucumbers and melons are grown in summer. The bottom-heat is derived from open iron gutters; over these gutters is a slate extending all round the house, with a path down the centre. On the top of this slate two inches of rough leaf-mould is strewed for drainage; over that, three inches of sandy loam; and on the top of the loam, half an inch of common pit-sand. The cuttings are inserted with a small dibber on this prepared bed, the surface watered until it is perfectly level—a point of great moment. A temperature of 60° is maintained. The house is never shaded; and in less than a month we thus root 4,000 plants, with about 1 per cent. loss. Verbenas also root well in the same way; but in bright weather they require shading. However, for verbenas, ageratums, and calceolarias, in the spring, no place is better than a pit or frame with top and bottom heat of from 60° to 70°. If any or all of these have been gradually hardened off in the winter, the store pots ought to be now plunged into a temperature of 50° or 60°, for a week or fortnight before the tops are removed for cuttings. Within certain limits, the more tender the shoots of such plants are, the more rapidly they will emit roots. Place dahlia-roots, also, in heat at this time, to excite healthy growth for cuttings.

569. Sweep and roll turf and gravel; finish laying turf; top-dress, turn, renew, and relay the edgings of walks; and let cleanliness and neatness compensate as far as possible for the absence of floral beauty.

570. *Shrubberies.*—Push forward the digging and clearing of shrubberies. The great point in the management of shrubberies, however, is so to plant, prune, and train the shrubs, as to render these operations unnecessary. The raw edges, and masses of bare soil, that render digging and cleaning an injurious necessity, also mar the beauty and grandeur of masses of shrubs. As a rule, their branches should sweep the edges of the turf; and the culture of herbaceous plants should never be attempted among them.

571. Where digging has to be performed, it should assume the character of pointing. Among shrubs, this operation should be performed by running the spade along the whole length, about three inches beneath the surface, and in-

verting it. This process buries the leaves and rubbish, without injuring the roots. The growth of shrubs should also be regulated by pruning and training, as the cleaning proceeds. Common laurels and lilacs will often be found overriding rhododendrons, or other shrubs: the most worthless should always be removed, or boldly cut in. Rhododendrons are often very effective as margins to masses of other shrubs, and they are invaluable in groups by themselves. No collection of shrubs, and no garden, should be considered complete without an assemblage of hardy heaths. They flower chiefly at the end of summer and during the autumn, and the species of Carnea blooms early in the spring. For beauty of habit, delicacy of tint, sweetness of perfume, usefulness and durability of bloom, they have few rivals. They are also cheap. Good strong bushy plants, of many varieties, can be supplied by most of our leading American nurserymen at less than a shilling apiece in hundreds. In many parts of the country they can be collected from the hills for nothing. They can also be increased by cuttings, layers, and seed. The one great drawback to their culture is, that generally they must have peat-earth to bring them to perfection or maintain them in health. I have had carnea, and several other varieties, do very well in a mixture of loam and leaf-mould. As a rule, however, they all thrive best in a hard, sandy, gritty peat. Bog-peat is hardly fit for their growth, unless it is liberally mixed with sharp sand and the *débris* of freestone rocks. Dryness and hardness of soil seem to be essential to their maintenance in health. No one can have traversed heath-clad mountains without being convinced of this. From six inches to a foot of soil is more than most of them find in their natural habitats. It must be borne in mind, however, that in such situations the whole surface is covered with plants; consequently the evaporation of moisture from the soil is checked by the leaves and branches. For their culture in the garden, from 18 inches to 2 feet of such soil, resting on a dry bottom, would be desirable. Beds or groups of hardy heaths would make a charming display. Such groups would harmonize well with the different fir-trees in or near to the Pinetum. Nothing could exceed their beauty, congruity, and adaptabilty, as furnishings for rock-work. Peat-earth could easily be introduced among the crevices, between stones, &c., and the heaths introduced there. They would thrive admirably in such situations, and contrast well with the ferns and other plants that find a congenial home in such localities.

572. The following are the varieties most generally cultivated for sale:—

Erica australis.
,, herbacea.
,, ,, carnea.
,, cinerea alba.
,, ,, rosea.
,, ,, rubra.
,, lanceolata.
,, mediterranea.
,, ,, hibernica.
,, Mackaiana.
,, stricta.
,, Tetralix rubra.

Erica Tetralix alba.
,, vagrans carnea.
,, vulgaris alba.
,, ,, ,, minor.
,, ,, coccinea.
,, ,, decumbens.
,, ,, Hammondii.
,, ,, pumila.
,, ,, pygmæa.
,, ,, variegata.
,, ,, rigida.
,, ,, variabilis.

573. *Reserve Garden.*—If the weather continues open, the following hardy annuals should be sown during the month:—

Alyssum calycinum (Sweet Alyssum).
Calandrinia speciosa.
Eutoca Manglesii.
Collinsia bicolor.
,, grandiflora.
Bartonia aurea.
Calliopsis Drummondii.
,, bicolor atrosanguinea.
Chrysanthemum coronarium.
Leptosiphon androsaceus.
,, flore albus.
Limnanthes grandiflora.
Nemophila atomaria.
,, insignis.
,, discoidalis.
,, maculata.
Iberis coronaria (Candytuft).
,, umbellata.
Iberis umbellata alba.
,, odorata.
Erysimum Perofskianum.
Entoca viscida.
Gilia tricolor.
,, ,, alba.
,, ,, rosea.
Sphenogyne speciosa.
Leptosiphon densiflorus.
Schizanthus porrigens.
,, pinnatus.
,, ,, Priestii.
Silene pendula.
Viscaria oculata.
Eschscholtzia californica.
,, crocea.
,, ,, alba.

574. There are many other beautiful hardy annuals, some of which, such as the Lupines, had better not be sown till March. Only half the packets of the above seeds should be sown in February, and the other half reserved for a second sowing, either in the reserve garden or on the borders and beds where they are to bloom. Those sown during March or the beginning of April are more to be depended on than the earlier sowings. However, the above will prove quite hardy in ordinary seasons, unless the frost is very severe just as they are coming through the ground; in that case, some slight protection should be afforded them. Hence one great advantage of sowing all early seeds in the reserve garden, where any necessary shelter may easily be provided. If the weather continues mild, autumn-sown annuals may be transplanted during the month;—from 2 to 4 inches square, according to the size and habits of the plants, will be a proper distance apart. With the exception of ten-week stocks, which should be sown in pots or a frame at once, the sowing of all other tender or half-hardy annuals may safely be deferred to nex month; material, however, should be collected, and frames got in readiness for this purpose. Excellent instructions have already appeared on this subject at pages 184 and 185, so that it will be unnecessary to repeat them here; however, it must ever be borne in mind, that a very gentle heat is sufficient to insure the germination of most flower-seeds. A bottom- and surface-heat ranging from 50° to 55° will generally be amply sufficient for this purpose; so that the quantity of material required will only be about one-half of what would be necessary to raise or grow cucumbers. Guard choice tulips, hyacinths, &c., against the attacks of mice and snails. An endless variety of traps have been invented for the former: no trap is more efficient for the latter than leaves of the cabbage tribe, laid flat on the ground, and carefully examined every night; if left till morning, possibly the leaves will be eaten, and the snail hid beyond our reach.

575. *Ranunculuses.*—Next to the tulip, perhaps these are the most beautiful of all bulbs or tubers, if, indeed, their claw-like roots deserve these

names. They rival the tulip in brilliancy of colour, and many prefer the beautifully-arranged balls of the ranunculus to the stiff formal cups of the tulip; both, however, have their distinctive features of beauty, and deserve a place in every garden. They may be planted from October to the end of this month, some preferring one period and some another: perhaps no better time could be chosen for planting than the beginning or middle of February. As soon as the beds are in a fit state, lose no time in planting, if the weather be favourable; but waiting a day, or even a week, is nothing in comparison with placing the roots in soil in an unfit state to receive them. They are best cultivated in 4-feet beds of rich loam mixed with one-fourth part of decomposed cowdung. The soil should be dug from 2 to 2½ feet deep, and if the situation is moist and partially sheltered, so much the better. A constant supply of moisture is essential to their beauty and growth, although an excess of water would destroy the tubers during the cold of winter and early spring: after their blossom-buds are formed, however, the surface of the beds must never be allowed to become dry; a daily soaking of water will then be necessary in dry weather, not only for the sake of the flowers, but to preserve the roots from injury, these being very near the surface. The roots should be planted about 2 inches deep and 6 inches apart; their claw-like extremities should be pressed firmly into the earth, and the crowns be covered with an inch of sand previous to another inch of soil being spread over them; the beds may then be covered with a layer of spruce branches, straw litter, or leaf-mould, to protect them from the frost: this will, of course, be removed before the appearance of the plants above ground.

576. Ranunculuses are increased by offsets, dividing the tubers, and seed. Offsets is the usual mode of increase, and they are generally sufficiently strong to flower the first year. Choice sorts may also be divided into several plants; every little knot that appears on the top of a tuber will form a plant if carefully divided, so as to insure an accompanying claw. Unless, however, for choice sorts, this mode of increase is not desirable: by seed is the most rapid mode of increase, as well as the only way of securing new varieties. It is said by some persons that ranunculuses never come true from seed, so that variety is certain. Perhaps the best time for sowing is the month of January, and the best place a cold frame. Sow either in the frame, or in pots or boxes, on a smooth hardish surface, and barely cover the seed with soil. Exclude the frost, and keep the frame close until the plants show two seed-leaves; then gradually inure them to more air, until the light may be entirely removed in May. The little tubers may be taken up when the foliage is quite ripened off: they will require the same, or even more attention, in watering than the old roots.

577. Some prefer sowing the seed on beds out of doors in the autumn or spring months. Generally, ranunculuses will have died down, and be fit for taking up and storing, by the end of June or beginning of July. The place for storing should be dry; a drawer with a bed of sand being the most convenient. The following are good varieties:—

La Céleste,—violet.
La Charmante,—light rose.
La Pucelle de Paris,—yellow.
Mathilde,—purplish blue.
Mont Blanc,—white,
Nosegay,—yellow-brown spotted, sweet-scented.
Œil-noir,—true black.
Habet Electoral,—golden yellow.
Hasdrubal,—deep rose.
Herculaneum,—purple-spotted.
Horatius,—dark grey.
Gloria Florum,—brown.
Formosum,—brown and yellow.
Genevra,—citron.
Fireball,—fire-red.
Eleonora,—rose.
El Dorado,—yellow and brown.
Dictator,—scarlet.
Comtesse de Pompadour,—deep yellow.
Comte de Gloire,—blood-red.
Comte d'Artois,—white.
Abbé d'Elugne,—dark brown.
Amazon,—light purple.
Argus,—velvety brown.
Bergère Blanche,—white, rose-spotted.
Belle Forme,—white, red-spotted.
Blanche Amiable,—white.
Black Prince,—black.
Ceres,—purple variegated.
Clothilde,—rose variegated.
Rinaldo,—velvety black.
Reine des Violettes,—velvet.
Quintinianus,—rose-spotted.
Princesse d'Orange,—orange.
Polydore,—velvety blackish purple.
Penelope,—rose and yellow.
Rose sans-égal,—white, rose-feathered.
Temple van Apollo,—dark purple.
Valois,—dark brown.
Vocabule,—white and rose.

578. *Turban Ranunculus.*—These are somewhat hardier, and even more showy, than the other varieties; they are not yet very numerous. The following half-dozen are very beautiful: it would be difficult to imagine anything more gorgeous than a bed of scarlet Turbans in flower.

Hercules,—white.
Grandiflora,—crimson.
Turban d'Or,—golden.
Variegata,—brown, red, & yellow, mottled.
Romano,—scarlet.
,, dark, black or brown.

579. *Anemones.*—These are harder than the ranunculuses, have a richer foliage, and their flowers resemble miniature semi-double hollyhocks. They also include most of the colours of the hollyhock, except a pure white or yellow; and to compensate for the want of these, nothing can exceed in loveliness the blue, or in glory the scarlet, of the anemone. And although, as far as I am aware, there is neither a white nor a yellow self (the single *white* is not *white*), yet several of them are beautifully striped with these colours. They may be planted from October to the end of March, and a succession of bloom thus secured, in mild seasons, from February until July. A poor calcareous dry soil seems to suit them best, but they will flower well in almost any common garden soil. I hope to furnish a list of sorts, and give an epitome of their culture, in October or November. Those who wish to plant them at once may procure 100 named varieties for 25*s.*; ditto, mixed, 6*s.*; ditto, scarlet, 10*s.*, from any large nurseryman. They should be planted in the same manner and about the same depth as ranunculuses, from 8 to 10 inches apart.

580. *Auriculas, Carnations,* and other florists' flowers in frames, must be carefully attended to during the month. During dull weather, the lights should be tilted up, either at the sides or the top, in preference to pushing them down or drawing them up. This mode of ventilation will prevent the fog or moisture in the air from being deposited on the leaves, a point of the first importance during damp or frosty weather. Never water unless absolutely necessary, and then do it thoroughly, taking care to keep the leaves dry, and not allow a drop to fall on the crowns of the plants. During mild weather, too much air

can hardly be given; but avoid cutting draughts of cold air. On genial days, when the sun shines for a few hours, remove the lights entirely, and clean and gently stir the surface-soil, removing every decayed leaf, spot of fungus, and all impurities both from plants and frame. A dirty frame will soon engender sickness and disease among plants; and diseased plants will rapidly infect the frame: hence the necessity of perfect cleanliness in both. Whenever a fœtid, unhealthy atmosphere is discovered, the plants should be removed, the plunging material thrown out, the whole interior of the frame painted with hot lime-and-water, and fumigated with sulphur burnt over a hot coal. An hour's reign of the sulphur fumes will suffice to destroy every living thing, and drive out or neutralize the noxious malaria. The light or lights should then be removed, and be thoroughly washed with warm water and soap; fresh plunging matter (nothing equals clean coal-ashes) introduced, and the plants re-arranged. Such preventive and curative measures often check incipient disease, and save valuable collections of plants.

581. Top-dress auriculas and pinks with rich soil, and re-pot all pansies that are intended to be bloomed in pots. Eight-inch pots are those most generally used for this purpose, but the size must depend upon the strength of the plants. To insure a good bloom, they should not be shifted into larger pots after this period.—D. T. F.

§ 3.—THE KITCHEN GARDEN

582. The operations in the kitchen-garden this month depend very much on the weather. In mild open weather, a sowing of radish is made, and to protect them from birds and frost, cover lightly with straw or fern, uncovering the beds occasionally in mild weather. Chaffinches are very fond of pulling up these, and other seeds, as they appear through the ground; so that they should not be left unprotected: netting stretched over them will admit light and air, and exclude the birds; white worsted will keep them off for a day or two; but they soon get used to it; and scarecrows are equally ineffective. A covering of tiffany canvas or calico stretched on laths, will be effective, and resist the March winds more than straw or fern: they need be but a few inches from the ground. If the ground is in condition for treading, it is best to do so, as, indeed, it is with nearly all seeds; but if the ground is apt to clod or bind, it should by no means be trodden, but covered with light soil, or pressed in with the rake. The ground, in such cases, should be marked into beds of convenient width, allowing a foot or 15 inches between, for alleys, to stand in, never treading on the beds. This comes naturally enough after a little practice; but experience is a dear school to learn in, and the most inexperienced, by following some such directions, may avoid failure as certainly as the most practised. Some gardeners, whose ground is limited, are in the habit of sowing parsley, carrots, onions, leeks, or some such crop, which takes longer to grow, along with radishes, sowing both together, the

radishes coming off soon after the others are up. This may be a saving of time or room; but where there is plenty of space, it is not advisable to sow two crops together, but let every crop have the best chance of doing well. It is, however, advisable, this month, to sow early crops of the above: although they are best sown in frames, they do well on a warm border.

583. *Seakale.*—About this time it is advisable to begin forcing seakale; if forced earlier, it is not so good or abundant, and if left till March, artificial heat is almost unnecessary. The best way of raising seakale is from seed, which should be sown in drills, about four or five feet apart, and three inches deep: this should be done about the beginning of April. When sufficiently large to tell which plants are strongest, thin them to about three inches; in July transplant some, leaving them in the rows, a foot or 18 inches apart.

584. Some would recommend planting these thinnings on ridges raised a foot high or so, placing the plants in threes or fours, the clusters being a yard apart and the ridges five feet. It is affirmed, that when heat is applied to seakale planted in this way, the ground gets warmed, so that the plants get bottom-heat as well as top. In theory this seems rational enough, but in practice I have found no striking, or, indeed, visible advantage in it; but it is as well to plant them in clumps of three or four together, a yard apart: in this way a bunch of crowns is formed, over which to place a kalepot, a great advantage in that which is to be forced. During the summer and autumn the ground should be kept clear of weeds, and often stirred; and in dry weather copiously watered, especially that which has been transplanted.

585. Seakale is best managed in the open ground, where, if planted on ridges in clusters of three, a yard apart, it may be forced any time in the winter, by putting the pots on, and covering them with about three feet of fermenting dung: with a moderate heat, it takes about three weeks, from the time of covering till ready to cut. Never break off the leaves, but leave them to decay naturally, when they may be removed.

586. Continue to wheel manure on to vacant ground, and get all digging, trenching, and in fact all ground-work, as forward as possible, bearing in mind that much of the success of the season depends upon it; and how important it is to have the ground prepared a week or two before cropping, especially where it is heavy or retentive, for none but a practised workman can appreciate the advantage of having the surface in that finely-pulverized condition that follows sharp frost and drying winds.

587. *Cauliflowers,* under hand-glasses, should have all the air, sun, and light possible, and gentle showers in mild weather, where they are protected from frost, cold winds, or heavy rains. Dust them also occasionally with lime, to destroy slugs, and stir the earth about the roots.

588. *Peas* which are advancing should be earthed up, both to protect and strengthen them. A dusting now and then with lime will protect from birds and mice; or white worsted stretched along the rows will do so, if rightly managed. One way is to have some half-circular pieces of board, a foot wide, with pegs nailed to them to thrust into the ground; then have five or six

small nails on the upper edge at regular distances: these are fixed into the ground at each end of the row, and as many lines of worsted as there are nails passed over the peas. This covers them completely in; others lay branchy sticks over them. Some sow rather thickly and leave them fully exposed, affirming that by allowing for loss, the others are not drawn up, thus avoiding more covering than is necessary to insure a good crop.

589. Dwarf peas may always be grown advantageously where sticks are an object, and these may be sown closer together. The Bishop dwarf, long-podded, is a good cropper, and may be grown without sticks; but where sticks or where hurdles can be obtained, it is no saving to grow without them, for the taller sorts, which grow six or eight feet high, bear most enormously if in good soil and mulched. During this month it is advisable to get in some of the medium sorts, as Auvergne, Imperial, Scimitar, or Champion; but the later sorts had better be left till next month.

590. *Broad Beans* of any sort may be got in for succession.

591. *Cabbages.*—Look over the row of cabbages, and see if any are eaten by vermin. A dusting of lime when the ground is wet, or early in the morning, will destroy slugs. Another good plan at this time of the year is to let a few ducks into the kitchen-garden for half an hour or so every morning; they will destroy immense quantities of slugs, snails, worms, and grubs. Replace all the plants that have been destroyed by frost or otherwise, and draw earth up to the stems. It is advisable to sow under hand-glasses a little cabbage, of some quick-heading kind, as early York or Eastham, or indeed any sort: they will follow those which have stood the winter, and be very useful in July, August, and September. Some Brussels sprouts may be sown; also purple Cape and Walcheren broccoli, for autumn use.

592. *Parsley* may be sown in drills, or broadcast, or as edgings, or between dwarf or short-lived crops. The seed should be but slightly covered, trodden or pressed in, according to the state of the soil, and raked evenly. It takes several weeks to germinate at this season of the year.

593. *Carrots* of the short-horn sort, if sown on a warm border now, will come into use in May, and be very sweet and good. Sow rather thickly, and thin to two inches apart. To produce carrots and parsnips of an extraordinary size, make a very deep hole with a long dibble; ram the earth well round it while the dibble is in, and when it is removed, fill up the hole with fine rich earth. Sow a few seeds on the top, either parsnips or carrots, as may be required, and when up, draw out all except the one plant nearest to the centre of the hole. Prodigious carrots and parsnips may be produced by this means.

594. *Onions* for salading may be sown on a warm border. A small sowing of leeks may be made at the same time and in the same manner, but not quite so thick. A top-dressing of soot once a fortnight, or even oftener if the weather be rainy, will have a very great effect upon the onion crop, and will prove an effectual remedy against the maggot at the root, which so often destroys the entire crop, especially on highly-manured land.

595. *Red Beet,* if sown now, will be very useful late in the summer. Sow in

drills 9 or 10 inches apart, or broadcast, and thin to the same distance. The white beet may be sown for the leaves, which are eaten like spinach in summer.

596. *Early Potatoes* may be planted on a south border, or under a wall having a sunny aspect. At this time it is well to plant middling-sized tubers whole. The early tops are apt to get cut off by spring frosts; but they bear none the less for it, and they may be recovered if not too severely frozen, by watering with cold water before the sun is up.

597. *Salading and Potherbs.*—Lettuces should be sown now for succession. Mustard-and-cress may be sown under hand-glasses. American cress, which is much the same as water-cress, may also be sown on a sunny border; it is very useful for salading, and easily cultivated. Chervil may be sown about the end of this month, and also other potherbs, as savory, marjoram, coriander, and hyssop: unless it is desired to have them very early, however, it is as well to defer sowing these till next month. They are mostly very slow in germinating.

598. *Scorzoneras, Salsafy, Hamburg Parsley, &c.*—It is as well to defer sowing main crops of these things till next month: the advantage of having early crops is great, but they should be proportioned to the extent of room, the time they last, or the wants of the family. A square rod of ground will generally be sufficient for early sowings of most of the principal crops, but herbs and salads will do with less, and it is best to look forward to what is to be done during the whole season, and calculate to a nicety what can be grown on every part without wasting room, or crowding and over-cropping, and exhausting the soil beyond the power of manure to restore it. It may seem advisable to make early use of the ground, and get it three-parts cropped in February; but in May and June it will be seen that a fatal error has been committed.

§ 4.—FRUIT-GARDEN.

599. *Strawberries.*—If it is desirable to make new plantations of strawberries at this time, it may be done by taking up runners with a trowel, and planting them 18 inches apart. It is easy to select plants that will flower and fruit the same year by the crowns, which, if plump and full, indicate flower-buds. After planting, mulch with dung: they will bear much more freely, and it is important to do this early. Old plants should be cleaned and mulched.

600. *Raspberries* should be pruned without delay, if not done before. Cut out all the old canes, and thin out the new to four or five; shorten them one-third, and if necessary support them with sticks, rails, or by arching them together. If this is done carefully, only tying two together, it will answer better than by tying them to stakes.

601. *Gooseberry and Currant-bushes* should be pruned where formerly omitted. In pruning gooseberries, the object is merely to thin out and regulate the shoots, which need not be shortened except to keep them off the ground. In pruning currants, the object is to produce short fruit-bearing

spurs, so that all the shoots except the leaders should be cut in three-fourths, the leading shoots about one-half, or rather more.

602. *Black Currants* should scarcely be cut at all; they do not bear so well if much pruned, so that a little thinning or reducing into shape is all that ought to be done.

603. *Apples and Pears.*—Finish pruning all fruit-trees this month, whether standards, espaliers, dwarf-bushes, pyramids, pillars, or trained on walls. In pruning these, the main object is to produce short fruiting-spurs, so that all vigorous shoots should be shortened in; but the stronger the shoots the less they should be cut; for too close cutting throws them into the production of wood and leaf, and not fruit. Figs on walls should scarcely be cut at all, and no trees in frosty weather.

604. *Peaches, Apricots, and Nectarines,* on walls, ought to to be unnailed and pruned this month. Thin out the shoots till they lie about six inches from each other, and shorten or not according to the strength of the tree or shoot: if very strong, shorten little or none; but if the end of a weak shoot terminates still more weakly, cut back to a double-bud—that is, one leaf-bud between two flower-buds: prune neatly in this way, and tack them up again with fresh nails and shreds. The trees should be done over in this way every winter, but it is important that the shoots be thinned out and disbudded in summer time.—F. C.

§ 5.—The Culture of Flowers under Glass.

605 Glass and fire, capital, enterprise, and cultural skill, enable us to produce the luscious fruits of all lands in any given place, and to converge the scattered rays of floral beauty diffused throughout the world into one dazzling focus of surpassing loveliness. Glass, at one time a luxury in our dwellings, has become a primary necessity in our gardens, and nothing has given a greater stimulus to horticulture than the abolition of the excise-duty upon glass. The improvement in the quality and reduction of price consequent upon this measure, have brought glass houses of some description within reach even of the toiling millions; and the time is probably at hand when every sober, industrious man may grow his *own* cucumbers and melons, and enjoy the beauty of rare exotic plants in his *own* conservatory. More money is annually wasted on beer, wine, and spirits, than would build and furnish such a structure for every head of a family in the kingdom. In future numbers, details of construction, and qualities and prices of glass, will be given; and while the requirements of the largest places will be provided for, the wants of the working-man will not be overlooked. And so in the Calendars of instructions, while My Lady's bouquet and My Lord's table will be taken care of, Mrs. Smith's posy of flowers and John's humble dessert will also be kept in mind.

606. Plant-houses obviously divide themselves into houses for *show* and houses for *growth.* The former should be devoted to plants in flower, or comparatively perfect plants, with handsome foliage; the latter to plants in their

incipient preparatory stages. The object in the show-house or houses is to preserve the plants in the *same state* as long as possible; the aim in the other houses will be to urge the plants forward as rapidly towards perfection as may be consistent with their well-being. Diametrically opposite means must be employed to secure these nearly opposing results. Hence the necessity of the division indicated. A comparatively dry, cool, well-ventilated house tends to prolong the blooming period of plants to the utmost; a moist, warm, close house is best adapted to secure rapid expansion and perfect growth. The term Conservatory is generally given to a house for preserving plants in flower; the Greenhouse being a house devoted chiefly to Cape heaths and other hard-wooded plants, in complete establishments in which geraniums, fuchsias, and other soft-wooded plants have separate houses devoted to them. In places where two or more houses exist for the culture of stove-plants, one of the houses should be a *conservative* and the other a *progressive* stove; and if an intermediate one could be provided to receive the plants as they go out of flower, the trio would complete a most useful cultural circle.

607. *Conservatory.*—Here Camellias, Arums, Epacrises, Salvia splendens, Chinese Primroses, a few Heaths, Lachnalias, and perhaps forced Lilacs, Azaleas, Rhododendrons, Hyacinths, Narcissuses, Crocuses, and other bulbs, will now be either in flower or coming into flower-bud. Keep a night temperature of from 40° to 45°, allowing a rise of 10° with sun-heat. Unless during very severe frost or cutting winds, give air daily, if only for an hour at noon, to change the atmosphere of the house and dry up drip. Prune, and destroy scale and other insects on climbers and other permanent plants. All plants should be carefully examined before they are introduced into this house, in order to prevent an importation of insects, as smoking with tobacco, or other insect-destroying processes, are not only very disagreeable, but are most inimical to the beauty and longevity of the flowers. Examine, water, and top-dress if necessary, any of the borders. Remove all plants back to their respective quarters as soon as their flower fades, and introduce fresh supplies from forcing-pits, greenhouse, or stove, and let no dead leaf, or flower, or dirt of any description, be allowed to mar the sense of delight which this house and its occupants should ever be calculated to inspire.

608. *Greenhouse.*— More air may be given to, and 5° less heat will suffice for this house than for the conservatory. Now is a good time to examine and clean the whole stock of plants. Many of the acacias and epacrises are apt to become infested with scale. So liable to this pest are many of them, that it seems to be a constitutional tendency; its eradication, too, is very difficult. Prevention is the only remedy, for I am well-nigh convinced that a perfect cure is impossible. So doubtful is this point, that I would rather spend a week in looking over an entire collection without finding a single scale, than an hour in trying any nostrum upon a single infected plant. After experimenting upon everything, Gishurst's compound included, for scale and bug, I fearlessly assert that there is no remedy for these pests but removing and destroying them. Spirits of wine, indeed, will kill the latter, but it is powerless upon the former. It has also the

great drawback of killing some of the tender leaves. If any dust or soot has accumulated on the leaves of heaths and azaleas, they will be much benefitted by a good washing. The best mode of proceeding is to hold the plant on one side over a tub of water, turning it round in all directions, while an assistant dashes the water violently upon it with a syringe. Very dirty plants may sometimes require to have their leaves sponged with soap-and-water in addition to this. Water with care, examining carefully the balls of the plants, which, in heaths, sometimes become so hard and dry, that the water refuses to pass through. They should never be allowed to become so, but if found in this condition, they should be plunged into a pail of water for 12 or 24 hours, until the ball is thoroughly soaked. Pick off the flowers of winter-blooming heaths as soon as their beauty has faded. Carefully watch weak downy-leaved varieties for the first symptoms of mildew, and refrain from syringing any of them overhead in dull weather. Towards the end of the month several species of greenhouse-plants, such as Kalosanthus, Baronias, Chorozemas, Dillwynias, Pimeleas, and Azaleas, might be shifted into larger pots. Most of these thrive well in good fibrous peat and a little loam, liberally intermixed with sharp silver-sand and charcoal. One of the chief things to attend to before placing any plant whatever, but especially any hard-wooded plant, into a larger pot, is to see that the old ball is in a nice healthy growing state. The extremities of the roots should also be carefully untwisted or unwound, to induce them to start at once in the fresh soil. The new soil must also be pressed firmly into the pots, or the water will pass through it, instead of penetrating through the old mass of roots. More hard-wooded plants are destroyed through inattention to these points, than by all other sources of mismanagement put together. At this season of the year green-fly often attacks Pimeleas, Leschenanaultorias, and other plants: let them be destroyed at once, by fumigation with tobacco-smoke.

609. *Pelargoniums* now delight in a temperature of from 45° to 50°, with 10° increase by sun-heat. Scarcely any rise of temperature should be permitted, however, before the house is slightly ventilated. The sun's rays striking upon plants with any drops of condensed moisture on the leaves, is certainly one cause of the *spot* on these plants. Cutting draughts of cold wind are doubtless another cause of the same disease. This must be specially guarded against on bright days, when the air is keen and harsh. Shifting the young successional stock should now be completed. The soil they delight in consists in two parts good turfy loam and one of leaf-mould, with a slight admixture of thoroughly decomposed cowdung, and a liberal sprinkling of silver-sand. The chief work here at present will consist in stirring the surface of the large plants, staking, training, and watering. The water should be say 5° warmer than the temperature of the house, and in dull weather, or indeed any weather at this season, the foliage must be kept dry.

610. *Fancy Pelargoniums* will bear a temperature of 5° or 10° more than the other varieties. They should be potted in lighter soil, and even more carefully watered, as altogether their constitutions are more tender. The shoots will now require thinning and training.

611. *Calceolarias and Cinerarias* enjoy a temperature of from 45° to 55°. Well-rooted plants of the former should be shifted into the compost recommended last month; and plants for very late flowering of the latter may also be shifted. The earliest cinerarias will now be opening their flowers in the conservatory, and a succession coming on to supply their place. Green-flies are particularly fond of these plants, and they must be destroyed on their first appearance.

612. *Fuchsias,* after re-potting, thrive best if plunged in a gentle bottom-heat. Water carefully until fresh roots are emitted; shade in bright sunshine to prevent flagging. Thin out plants that have been cut down to a single shoot, if the pyramidal shape is desired; if bushes are wanted, leave three or four; and maintain a genial temperature of from 50° to 60°. Never cut down and shift a fuchsia at the same time, nor shake them out for re-potting before they have again begun to grow. After cutting down, allow the shoots to grow two or three inches: plants that have not been cut down must fairly *break* before they are re-potted. The young top-growths will then hasten the emission of roots, and the plants, with a moist atmosphere provided for a few days, will scarcely sustain any check.

613. *Forcing-Pit or House.*—This is an indispensable adjunct to a well-kept conservatory, and should now be occupied with bulbs for succession,—Rhododendrons, Azaleas, Ghent and Indian (most of which, especially the Indica alba, force admirably), Roses, Lilacs, Anne Boleyn; white and other Pinks, True Carnations, Cloves, &c., maintain at a genial growing temperature of 55° to 65°; on very cold nights, however, it may fall 5° or 10° with impunity.

614. *Plant-Stove.*—Maintain a temperature of from 60° to 65° fire-heat. Start the first batch of Achimenes, Gesnerias, Gloxinias, &c. Prune plants of Allamanda, Dipladenia, Clerodendron, &c. Pot Glorissa superba during the month: it thrives best plunged in a brisk bottom-heat. Many Ferns, Begonias, and other plants, should also be potted, and started into fresh growth. Some of the Dendrobiums, Stanhopeas, and Maxillarias should now be watered and pushed into flower. Prepare plenty of good peat and loam, broken potsherds, charcoal, &c. &c., for a general potting of all plants that require it. Hunt for and destroy mealy bug and scale, and maintain the semblance of health and reality of cleanliness throughout the whole of the plant structures.

§ 6.—FRUIT-CULTURE UNDER GLASS.

615. In the present day, this includes almost all known fruits, excepting, always, the haws, hips, sour crabs, sloes, &c. &c., that furnished the tooth-tempting, or rather setting-on-edge, dessert of the ancient Britons. How they would marvel at the dinner, *à la Russe,* of their modern successors! Nor would their wonder be lessened, to be told that we are now enabled to feast upon the fruits of the world, by mixing sand with a particle of soda; and going down into the bowels of the earth, and bringing up from thence bitumen-

ized charcoal. It would certainly puzzle them to know how these heterogeneous materials could produce such a delicious repast. It is doubtful, however, if they would consider them delicious. It is more probable that, with one terrific whine about the degeneracy of the times, they would bound through the nearest window, in search of their exquisite old hips, haws, &c. While they are hopelessly trying to find them, let us attend to the culture of our fruit.

616. *Vines.*—This is the most useful, ii not the most delicious, of all fruits. Some think the pine preferable; but nothing can exceed in grace and beauty a noble vine, laden with its rich clusters. It is one of the, if not the most nutritious of all fruits, and forms a main article of diet in many countries at the present day. It may also be said to constitute the backbone of our desserts throughout the year. Where several houses are devoted to its culture, grapes may be had every day, from the 1st of January to the end of December. The successful cultivation of the grape-vine has been a leading object with all gardeners in this country from the time of its introduction by the monks to the present day. Every variety of soil, and mode of treatment, have been tried, and so marvellous is the power of the vine in adapting itself to varying circumstances, that most of them have been more or less successful. On the poorest and the richest soils; in borders eight feet and borders two feet deep; among masses of brick and stone and putrid carrion; in the wettest and driest situations,—good grapes have occasionally been produced. A few leading principles, however, seem to form the basis of the successful culture of the grape vine. It should be planted on a dry bottom. The soil should be light, rich, and need not exceed three feet in depth. Its roots should be kept at the same or a few degrees higher temperature than its branches. These three points will secure abundance of healthy roots. Upon this, and a liberal supply of food, will depend the health and strength of the top. The vine is, in certain stages of its growth, what is termed a *gross feeder;*—hence has originated the gross absurdity of men attempting to feed it with *carrion.* No sooner, however, does a vine-root reach carrion, than its course follows in another direction; or, if this is impossible, it plunges into the putrid mass and dies. It not only cannot absorb carrion, but carrion kills the spongioles, or feeding-part of the root. The elements of the carrion might, indeed, afford nourishment to the vine, but man's stupidity has placed it exactly in the position to prevent it, for as long a period as possible, from being separated into its elements, and keep it in that state in which no root can absorb it. Exposed to the air, or thrown into water, the carrion would soon have been decomposed, and become acceptable as plant-food. Buried in a vine-border, it is locked up for months, on wet soils for years, and becomes a poisonous instead of an enriching agent. The best mode of feeding vines during their growing and fruiting stages, is either by a liberal application of manure-water, or a rich top-dressing of the very best manure. Both methods may be adopted, or only one, as seems best; but by either or both systems, the best food of the right quality, in such a state that the vine *can feed upon it,* would speedily be brought within reach of the roots.

617. Vines in houses, started in October, will now be swelling their fruit. Thin in time, and maintain a steady growing temperature of 65°.

618. Those started in January will show their bunches this month, and a temperature from 55° to 60° will be suitable. Some prefer leaving the disbudding until the bunches show, and then leave the best. This is safe practice, and I don't think the buds up to this stage exhaust the vine much.

619. In many places the first or second house will be started this month. See that all loose bark is removed from the vines—that they are thoroughly cleaned with soap-and-water, and painted over with a thick coating of equal parts of sulphur, soot, lime, and cowdung, made into a paste with strong soapsuds, previous to starting them. Begin with a temperature of 45°, and slowly and gradually increase it during the month 10° or 16°. Maintain a genial atmosphere in all the houses, by sprinkling the paths, syringing, &c.; and give as much air as the weather will permit, allowing a rise of 10° or 15° during sunshine. Grapes grown in pots require the same general treatment as those planted out. It will very much hasten the ripening of the fruit, if the pots are maintained in a steady bottom-heat of from 70° to 80°.

620. *Pines.*—From 65° to 70° should be the minimum temperature during the month: the bottom-heat may range from 5° to 10° higher. During dull weather a dry atmosphere must be preserved. The plants should be carefully examined previous to watering, and this operation, whenever necessary, performed so as to prevent the water getting into the axils of the leaves. Plants swelling their fruit should be placed at the warmest end of the house, and those intended for autumn or winter fruiting kept steadily growing, carefully guarding against any sudden check. Succession-plants in pots must be kept rather dry, and the linings and coverings carefully attended to.

621. *Peaches.*—In their early stages these are very impatient of heat. Begin with a temperature of 40°, and gradually rise to 50°. This should not be much exceeded until the fruit is set: then, by gradual ascent, from 5° to 10° may be added; and this is the maximum of fire-heat for peaches until the ticklish period of stoning is over. Syringe twice daily in bright weather, except when the trees are in flower. The borders should have a good soaking, if dry, before forcing commences. Give as much air as the weather will permit at all times. Unless bees make their appearance, the trees should often be gently shaken when in flower, and the pollen distributed by a camel-hair pencil, to insure the fructification of the blossoms.

622. *Figs* will bear a higher temperature than peaches, and may be started at 50°. The terminal buds of the young shoot should be removed, to insure a good crop. Maintain a moist atmosphere, and water copiously when necessary.

623. *Orchard-houses* should stand open night and day, unless during severe frosts. Plants in pots must not, however, be allowed to become too dry. The trees would be benefitted by being painted over with a similar composition to that recommended for vines. This would tend to prevent the attacks of insects, kill all moss and fungi, and render the buds safe from the ravages of birds, which often play sad havoc with trees in orchard-houses.

624. During dull weather, care must be exercised not to force the fruit-houses too rapidly, or their elongated spongy growth will be made at the expense of future strength and fruitfulness.—D. T. F.

§ 7.—Hotbed and Frame Cultivation.

625. *Cucumbers*, in full growth, require every attention. See that the heat of the beds does not fall below 70° : apply fresh linings as soon as this is the case. Attend to stopping and setting; allow no more than two or three cucumbers to grow at the same time on one plant; admit air in sunny weather, but not enough to produce a draught; give all the light possible, but cover at night with mats or straw, and add fresh earth if required. If it is desired to start more beds, the dung may be got ready and treated as formerly described, during which time the seed may be sown in pots and placed in a bed in full operation; or those who have not yet begun may proceed as described last month. Good loamy soil is best to grow them in, so that it is warm enough before planting. Place two plants on a mound, under each light; as they grow, add fresh soil till the bed is level. Peg the bines down as they grow: if a proper temperature and sweet dewy atmosphere pervade the frame, they will never be troubled with insects or mildew; but if they are chilled or over-heated, these will soon follow. If mildew attack them, sprinkle with water and dust with sulphur; if green-fly or thrips, fumigate with tobacco. The same directions apply to the culture of melons: but, before planting, make the soil pretty firm. These require the same temperature as cucumbers, and great care as regards watering: too dry, they are apt to become infested with red-spider; too wet, they are subject to canker: in the former case, apply sulphur, or syringing; in the latter, apply soot about the collar. Set many, but allow no more than two, or three at the most, to swell off at once; and cut away, or rather prevent, all superfluous growth, by pinching out every new shoot that is not wanted. Attend well to the application of fresh dung. Nothing can succeed unless the heat can be maintained.

626. Water of the same temperature as the bed is absolutely necessary in watering them, which should be done over the leaves, as well as at the roots, about twice or three times a week, which is as often as they are likely to want it. Still evaporation proceeds, and it is sometimes necessary, therefore, to make good the consequent loss; but in watering forcing-beds I would advise, first, the using of a fine rose, that the surface of the soil be not beaten down in the process; secondly, that the water is of a temperature nearly equal to that of the bed—rather above than below: and if liquid manure is used, it should be rather weak. For asparagus and seakale a little salt, about a teaspoonful to the gallon, may be advantageous; and, thirdly, it is better to water effectually at once, than to water little and often, because the latter is apt to keep the surface slimy and soddened, with no benefit to the plants, but rather the contrary.

627. *Seakale.*—Some families like to have seakale in by Christmas; but at whatever time it is in request, the process is the same. It may be forced in a frame or pit as before described, or put in pots made for the purpose, having covers to exclude the light, and these pots placed in a frame, pit, or warm greenhouse. The most common method is to place seakale-pots over the crowns, and cover these pots with fermenting dung or leaves: leaves are the safest, if not in too great quantity, or mixed with grass which is too wet: if stable dung is used, it should be well prepared by turning and allowing the rank heat to pass off. Too great a heat is likely to destroy the crop for the season, and the plants permanently. If left till March, the open-ground culture is best: then a little sand or ashes placed over the crowns, and banking over as we would earth-up celery, is sufficient. When the kale is fit to cut, it will be indicated by the plants.

628. *Early Asparagus* is forced in the following manner with most satisfactory results. In an ordinary melon-pit, about the beginning of February, a quantity of stable dung is set to work, by turning and shaking, as described in the January calendar, to sweeten and regulate the heat. By the middle of the month, as much of this is thrown into the pit as will fill it to within a foot of the glass. Two days afterwards, this is covered with a layer of three inches of mellow soil. On a mild day previous to this, a quantity of asparagus-roots should have been grubbed up from an old bed (which make the best plants for forcing), and placed ready. As soon as the fermenting material has arrived at a safe temperature—about 80°, these roots are packed thickly together on the three inches of soil, and more soil thrown on them, just sufficient to cover them, without increasing the weight too suddenly or too greatly. This precaution is necessary, because the addition of ten inches of earth would cause a rapid sinking and proportionate rise in the temperature of the dung, to the injury of the roots. Four days after planting, sufficient earth is put on to cover the crowns about six inches. In ten days the crowns begin to appear.

629. By this time the settling of the dung has brought the surface of the soil eighteen inches from the glass. Nothing more is required to be done than to cover them from frosts and give them an occasional watering, with a little salt in the water. This bed will continue to produce largely till the time asparagus is plentiful out of doors. Asparagus may be forced any time during the winter; but to have it earlier than February, a frame and dung-bed is better than a melon-pit, since the necessary heat must be maintained by means of outside linings: in other respects the treatment is much the same. It is advisable to be cautious in watering forcing-beds in the colder months, as I consider that a properly-made-up bed should contain moisture in itself sufficient, or nearly so, to nourish it.

630. *Frame Potatoes.*—It is also a good time to put some potatoes in a little heat. An excellent plan is to pare the soil off an old cucumber- or melon-bed; add 3 inches of fresh earth, then set the potatoes 15 inches or so apart, and cover with 5 or 6 inches more earth; put on the lights, and then give a good lining of prepared dung: this will cause heat, and the

potatoes will root into the dung of the old bed and be very fine: give these plenty of air, but never allow them to get frosted.

631. *French Beans* may still be sown as described last month, or they may be placed in an old hotbed fresh lined. As the season advances, they will require less heat, but will not do out of doors yet. Radishes, if sown now on a slight hotbed, will come in much earlier than those in cold frames.

632. Now is the time for making a hotbed for sowing ridge cucumbers, vegetable marrows, tomatoes, capsicums, and such plants. Those who have hotbeds in operation may sow these seeds in pots, and put them in the frames; otherwise it is necessary to make a bed for them. The advantage of the pit made of fagots, as described page 185, will be apparent: in raising things of this kind, the linings are more effective, and such beds will last several years, the fagots only sinking a little. Although it is advisable to get the dung, or begin to prepare it this month, it is not desirable to sow the seed till March; and even the third or fourth week is time enough; for these cannot be planted in the open air till quite the latter end of May, unless hand-glasses are used to cover them, and they are planted in a little heat, when they may be trusted out earlier; but March is quite early enough to raise them.

633. *Early Carrots* may be sown, for succession, on a slight hotbed; and very dwarf peas also, which may be treated in the same way as French beans, mustard cress, and lettuces, for succession. Some roots of mint, horseradish, dandelion, or chicory, may be potted and placed in a hotbed: some use them as salads. All but mint should be blanched, by covering from the light; for which purpose flowerpots will do: some parsley roots, potted up and placed in heat, may also be useful.

634. *Strawberry Plants* in pots placed in heat now will fruit in April: they will want liquid manure, occasionally, to keep them in vigour. Plants in cold pits or frames should be looked over often, dead leaves picked out, slugs and other pests destroyed. Cauliflowers, corn-salad, parsley, endive, lettuces, &c., in cold frames, should have the earth stirred between them occasionally; they should have every ray of sunshine, and be uncovered entirely in mild weather. Pick out dead leaves, and water if needful, but beware of over-wetting.

635. *Seedling Beds.*—Cauliflower, lettuce, cabbage, broccoli, radish, carrrot, onions, beet, &c., may be made in the cold pit or frame; they will not come on so quickly as those sown in heat, but will be earlier than those sown outdoors. It may be desirable now to commence raising flowering plants and tender annuals, for which purpose the fagot-pit will be useful. It is not well to begin too early, unless an abundance of manure is at hand; for be it known, that the earlier begun, the more dung to maintain the heat is required: but we may enter at greater length into this subject next month.

636. I have grown melons, both in frames and in an ordinary melon-pit; the latter is best for a main crop; but to have them early, a hotbed and frame is the next best thing to hot-water pits. In training them in a frame, have two plants under the middle, and each light placed close together; stop them at the second leaf, when each plant will throw out three shoots, which are trained

fan-like, so that the three shoots from each of the two plants radiate from a centre, and the laterals from these bear the fruit; but never allow more that one to swell off on the same vine, so that each plant has three vines, and each vine one fruit, or six melons from each light. In the pit which has six feet clear space from back to front, the procedure is as follows:—About the beginning of May, a quantity of stable dung is procured, and prepared by turning and wetting if necessary; this will be about the middle of the month; by that time the pit is cleared of what had formerly occupied it. The dung is then thrown in and levelled; three days after, some good stiff loam is laid on to the thickness of seven or eight inches; this is well trodden down, and in three days more the plants are put in a row, about eighteen inches from the back, and another about the same distance from the front, the plants being about eighteen inches apart. At the second leaf the plants are stopped, and each plant makes two vines, one trained towards the back of the pit, the other to the front. To insure a good crop, any number of fruit may be set; but one to each vine, or two to each plant, is sufficient; no more ought to be allowed to swell, and all superfluous growth should be prevented: the too common practice of allowing the plants to grow and set as they please, is not profitable: I have found it fail more than once. Both the cucumber and melon grow freely in a moist heat; a certain amount of humidity is indispensable to secure a vigorous and healthy growth; but the melon should be kept moderately dry while setting, and also at the time of ripening the fruit: a copious watering once a week is sufficient for the roots, but the foliage should be sprinkled every day, just before closing up for the night: early closing is best. Observe, that in watering cucumbers, melons, or any plants growing in heat, warm water should be used, otherwise the plants are retarded by the chill imparted by cold water.

637. Cucumbers and melons, it is known, are sometimes grown in pits heated with hot water; the superiority of this plan is so fully established, that none would be troubled with dung-beds after having tried it. The diminution of labour, the cleanliness and comfort, and last, but not least, the ornamental appearance of the suspended fruit, are decidedly preferable to the many inconveniences attached to the management of hotbeds. The Edmonstone pit may be an improvement on the ordinary dung-beds, inasmuch as it is cleaner and more under control; but every practical gardener would strongly protest against its introduction into any modern garden: the cost of building would pay for a span-roofed pit and appliances, and expense of manure would supply fuel, and the labour nearly all saved; this last being no trifling consideration.

§ 8.—WINDOW GARDENING.

638. Our neighbours across the Channel are greatly in advance of us in the cultivation of house-plants. "In Brussels," says M. Victor Paquet, "the

balconies are turned into greenhouses and miniature stoves, gay with the brightest and greenest foliage; and in Paris there are many contrivances in use by means of which the rarest and most beautiful plants are produced. Passifloras cling to columns in the upper floors; water-plants start into blossom, in tiny basins, curiously contrived in solid brickwork; and limpid water flows down a miniature rockery, from whose crevices start up ferns and lycopodiums." It is not our intention to recommend any such fairy-like adjuncts as those belonging to the bedroom *au quatrième* of Paris; but there are many appliances, of a very simple character, by means of which our rooms may be made gay with flowers of home cultivation. Many years ago, we accepted an invitation to visit a gentleman living in the very centre of the densest part of London,—a square, only second in its smoky atmosphere to the celebrated square in which Mr. Dickens has placed the Cherrible Brothers, and their factotum, Tim Linkinwater. We were ushered into a room well enough as to size, but in which darkness was nearly visible. Here we found every window occupied by a glass case, in which plants were growing in a manner which astonished us; ferns of the greenest and freshest hue; orchids, such as we have rarely seen surpassed, were growing there, redolent of health and vigour; and we were told, to our great surprise, that the cases were hermetically sealed, and that no water had been administered for many months. This was the first we had seen of the Wardian cases, since so celebrated.

639. A closer examination of Mr. Ward's system disabuses us of some of these first impressions, while it increases our admiration of the philosophical principle applied by the inventor of the Wardian case to floral culture. What Mr. Ward sought was uniformity of moisture and the exclusion of soot and other palpable impurities of the atmosphere: the air finds its way through imperfections in the glazing; and by inclosing plants in well-made and glazed cases light is admitted, and a proper degree of moisture secured. They are supposed to be a little world in themselves, influenced by common principles of evaporation and condensation. The heat of the sun or of the room produces evaporation during the day, and during the night the process of condensation restores the moisture to the soil.

640. The imperfection of the material used in glazing leads in course of time to a deficiency of the moisture, and a fresh supply becomes necessary. On the other hand, when the inside of the case becomes colder than the surrounding air, a deposit of dew takes place, which has been one of the difficulties of their cultivation: the only remedy is to render the temperature more equable within and without; and for this purpose it is necessary to have a door to the case.

641. It is obvious that these miniature greenhouses may be applied with great ease to any window; a pair of brackets on a level with the sill will form a stage, which may either support a case such as we have described, or a permanent greenhouse may be erected thereon. All that is required is a glazed frame, from 12 to 18 inches high in front, with glazed sides, rising to the window-sash at an angle of 30°, with a framework to receive a sash at the

same angle, which may be hinged to the window-frame. If this frame only extends to three-fourths of the height of the window, it will not interfere very materially with the light of the room. Of course, the plants are watered and arranged from the room within. All manner of ornamental projections may be thus formed, and large ornamental bell-glasses may be easily adjusted to vases for the hall and drawing-room, in producing which, every one will pursue their particular fancy. But whoever would have healthy plants in a sitting-room, of any kind whatever, should provide either a case or vase: the dry atmosphere which is agreeable to human beings is unsuitable for most plants.

642. A simple apparatus has been employed for the preservation of cut flowers, not dissimilar in principle to the Wardian case. A flat porcelain dish is filled with water, and a vase with cut flowers is placed on the dish; over the whole a bell-glass is placed, fitting to the edges of the porcelain dish. The air surrounding the flowers is thus kept in a moist state, supplying to the flowers the moisture yielded by the roots and leaves in their natural state, and maintaining them fresh and brilliant for a considerable time.

643. Where a window happens to be in a recess, a wooden trough, lined with lead or zinc, may be used for holding earth, in which climbing plants may be planted and trained about the recess. For this purpose the passion-flower is very suitable: if allowed, after crossing the top, to hang down before the window in festoons, displaying its naturally graceful pendulous habit, it will form a pleasant screen for a sunny window. A grape-vine may be grown in the same way, and it is always a graceful plant, while its fruit is excelled by no vegetable product when ripening in glowing clusters. But it is advisable to attempt nothing in this way which cannot be carried out perfectly; a single plant properly grown is to be preferred to the most elaborate attempts the working out of which has not been thoroughly considered; for instance, climbing plants must be very closely watched and carefully trained, or they become so entangled as to be anything but ornamental; they are apt, also, to harbour spiders and other insects, to drop their dead leaves and flowers, and, in common with other plants, they must be watered, which is always inconvenient in a room, for the pots must be well drained of superfluous moisture, otherwise the earth soddens in the pot. It would never do to let this superfluous water run over the carpet; the pots must consequently have flat basins to receive it, and the water removed from the basins without delay. These are drawbacks to window-gardening; but the true lovers of Flora will find in them no obstacle; to such the sight of a window festooned with trailing plants, and gay with flowers, will be sufficient inducement to overcome every difficulty in the way of its production.

644. Another feature in window-gardening is the introduction of suspended baskets, usually made of wire, for the purpose of displaying to advantage the beautiful habit of trailing plants. These we should recommend to be potted in ordinary flowerpots, and surrounded with moss in the basket, the latter being made to hook on to a staple in the ceiling, so that it may be taken away when the plant requires water. One of the most suitable plants for the purpose

is *Saxifraga sarmentosa*, which does well under ordinary treatment; it is of variegated foliage and highly ornamental. Another suitable plant is *Disandra prostrata*, with bright yellow flowers, and pretty foliage like ground ivy. Both these will trail eighteen inches or more from the basket in very graceful festoons.

645. Very prettily-designed troughs are now made to fit the window-sills; wire baskets, of ornamental patterns, are planted, some with ferns and lycopods, and others with trailing plants, having a very pretty effect, may be obtained at many of the shops near the markets. Some of these are made of wire; these require lining with moss to make them hold the soil; the moss ought to be partially dried, but damped again before using. Others are made of wood, ornamented outside; and some with pieces of fir cones tacked over them, which gives a neat and rustic appearance to them. Others, again, are ornamented with bark, or different-coloured pieces of wood. Terra-cotta vases, surrounded with wires for suspension, are also in use for the same purpose. When these baskets are of wood, they should be lined with zinc: this makes them more durable; for wood, as it decays, is sure to breed fungus, which is injurious to plants.

646. In planting a basket, if it is to be filled with ordinary soft-wooded flowering-plants, that is, geraniums, verbenas, petunias, &c., the soil ought to be two-thirds loam to one of very rotten dung or leaf-mould, and a little sand; if planted with ferns or hard-wooded plants, as *Myoporum parviflorum*, *Monochæton ensiferum*, *Pultenæas*, and the like, the soil should be one-half turfy loam and one-half peat, using rather more sand than for the freer-growing plants. To those who are not acquainted with soils, it may be worth while to observe, that good loam is of a yellowish hue, and feels soft and silky to the touch; it is usually the top spit of meadow-land, while peat is obtained in places where heath grows wild.

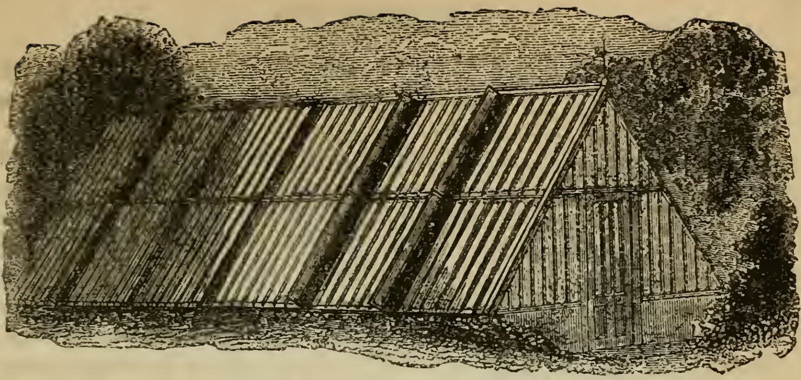
647. If the baskets are made of wire and lined with moss, they are sufficiently drained; if of wood, there should be one or more holes in each, to let out surplus moisture: as to soil, those who cannot obtain it otherwise may purchase it at the nearest nursery, properly prepared for the particular kind of plants it is intended for. In filling the baskets, put some rough lumpy soil at the bottom. This should lie hollow, so that surplus water may readily find an exit. The soil should be laid in roughly, with some broken pieces of potsherd mixed with it, when it will keep sweet for years.

648. The best plants for suspending in baskets are fuchsias of a pendulous habit, as Nil desperandum, a good fuchsia of beautiful drooping habit, red in colour. Better still, is the Duchess of Lancaster, a splendid white variety of a similar habit. The Princess of Prussia is a neat-growing plant, of drooping habit and very showy, the corolla of the flower being white, and the calyx and tube red. There are other drooping sorts, but none more suitable for the purpose than those named. These baskets being suspended within the room, and fuchsias being capable of standing a small amount of frost, if kept tolerably dry, they will live in this way for many years, flowering through the summer and often through the spring and autumn if the soil were coarse and lumpy

when placed in the basket: on the other hand, if they have been filled with fine sifted soil, the plants are apt to die off most unaccountably: this applies to window-plants generally.

649. Next to fuchsias, the best plants for suspended baskets are ivy-leaved geraniums; these being all of a trailing habit, they hang down and flower freely; the petunias and verbenas, also, which are of rich and varied colours. *Saxifraga sarmentosa,* of variegated foliage and pretty trailing habit; *Disandra prostrata,* with pretty yellow musk-like flowers. The common musk is also a very suitable plant: if a bit is planted in the centre, or some small pieces pricked about the surface, it will soon spread out and hang down the sides. The common moneywort (*Lysimachia nummularia*) does well and is effective; also the trailing snapdragon (*Linaria cymbalaria*), which will soon cover a basket and look very pretty.

650. Among hard-wooded plants suitable for suspended baskets, we may reckon *Myoporum parviflorum,* a very neat trailing plant, bearing small white flowers in autumn, winter, and spring; *Pultenæa subumbellata,* a neat spreading plant, flowering in spring. There are also one or two acacias, as *A. rotundifolia* and *A. ovata,* which are of a naturally pendulous habit; and if they can be adapted to the basket, they will be very effective. *Monochæton ensiferum* is a beautiful winter flowering plant, but will require tying down at first, and training neatly over the basket. In planting the hard-wooded plants, it should be remembered what was said with regard to soil; it may be, that the softer plants are more easy to cultivate; they are certainly safer to begin with; but these are more permanent, and do not so soon outgrow their room. Of a like permanency are ferns,, which require much the same soil as the last, that is, equal parts of peat, loam, and sand, and having some broken crockery mixed with it. One of the best ferns for baskets is the common polypody, or *Polypodium vulgare:* this may be planted in nearly all moss, with a small portion of soil. Another excellent fern, and, indeed, one of the handsomest, is *Asplenium flaccidum,* of a beautiful drooping habit, and also viviparous, producing young ferns all over the old fronds. Let this fern be placed in the centre of the basket: it will require nothing more, but will show over the sides and look exceedingly beautiful, being of a bright lively green, and one of the best and handsomest ferns in cultivation. *Pteris serrulata* and *P. rotundifolia* are also good ferns for baskets, and easily grown, being of a free habit. There are several sorts of British ferns which may be grown in this way, particularly the true British maidenhair (*Adiantum Capillus-Veneris*), which, spreading at the roots, will soon cover the surface of the basket. Next to this we should place *Asplenium lanceolatum,* which is also a spreader; likewise *A. marinum.* Other kinds might do in the same way, but we would not recommend those who are not well skilled in fern-culture to grow more than three or four at the commencement: a single well-grown handsome plant will become the fruitful parent of many. Ferns, be it remembered, are plants the beauty of which consists in the delicacy of outline of the fronds, and in the disposition of the sori, or fruit, as it is often called.



1.—ELEVATION OF A RANGE OF VINERIES.

CHAPTER XVII.

GLAZED HORTICULTURAL BUILDINGS.

651. Glass structures of even the smallest kind would, a very few years ago, have been considered a piece of great extravagance for any but the affluent. We have lately, however, heard of the garden which paid the rent; and although we cannot promise our readers quite so desirable a result, we can promise them, if they will only debit the garden account with what strictly belongs to it, and give credit according to the market value, for the luxuries as well as the necessaries of life they draw from it, they will find that a small garden and hothouse will not prove an expensive luxury, but a necessary adjunct, which need not be dispensed with on the score of economy; more especially, if either the master or mistress of the house happens to have a taste for such employment, and does not disdain to undertake, with their own hands, some of the lighter portions of the labour so needful to keep a garden in proper order. A gardening friend relates a case strongly in point, which we take the liberty to repeat. He was applied to for advice by a friend, who, through an accident, was precluded from taking walking exercise,—his inclination inclining to gardening, how far its practice would supply him with a proper amount of healthy exercise, without the necessity of walking. He took to the cultivation in consequence, not only practically but theoretically, and studied the physiology of the subject; reduced many of its directions to practice, and in a few years became one of the most successful cultivators of plants in England, and quite a leading gardener. He produced seedling-plants, which he sold from the very beginning of his career, so as to repay him for his outlay; for the production of seedlings, besides being a very interesting, is a very profitable occupation if followed with judgment; new varieties of pelargoniums, fuchsias, azaleas, and heaths, if tolerably perfect and never parted with until success is achieved, producing a return by no means inadequate to the trouble. Some amateurs have arrangements with certain nurseries, by which their gardens are furnished with all they require in exchange for the pick of their seedlings; and we are informed that Mr.

Wheeler, of Warminster, received £100 for the stock of a single dahlia,—Queen Victoria; while the Muscat Hamburg grape realized upwards of £800; and the Golden Hamburg, if we may believe common rumour, realized double that amount. Facts like these would intimate that gardening pursuits have their blue ribbon, while they yield many luxuries of an inexpensive character.

652. In former times, greenhouses were not only costly to fit up, but inefficient when erected. The proper principle of their construction was not very well understood: heavy rafters, complicated sashes, at once costly and inefficient, encumbered many a fine garden, as well as gardens of smaller pretensions. To Mr. Fleming, the gardener at Trentham Hall, Sir Joseph Paxton, and some other well-known cultivators, the merit is due of breaking through the old system, and proving to the world that light inexpensive structures were not only cheaper, but, actually, better adapted to their intended purpose than the old costly buildings.

§ 1.—CONSERVATORIES.

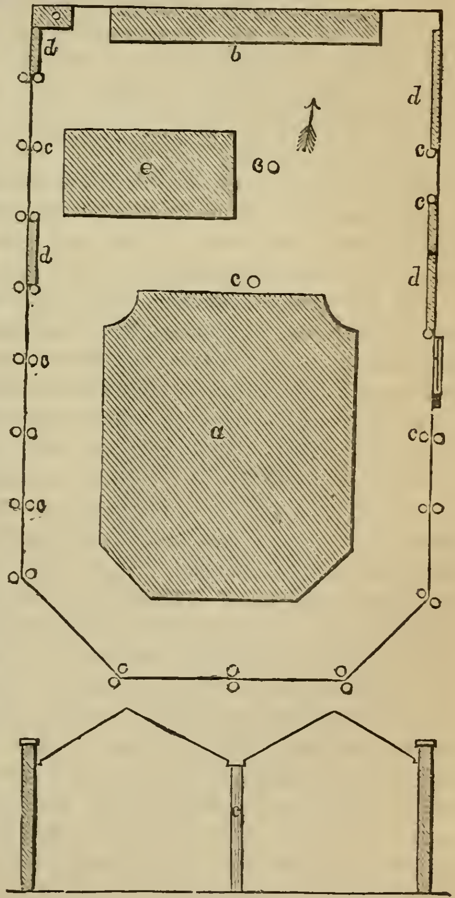
653. This structure may well be termed a winter garden, for such is its most useful purpose; it is really an essentially necessary adjunct to a well-ordered country-house of any pretensions, affording means of exercise to the ladies and visitors in inclement weather. In houses of smaller dimensions it is the storehouse for displaying the flowers as they are forced into bloom in the greenhouse or frames, as well as for growing certain climbing and creeping plants festooned and trained under its roof and over its walls, and for other plants only requiring protection from frosts, which occupy its beds and borders. Even in the absence of any heating apparatus, the conservatory, if properly glazed and painted, will bring the temperature of the atmosphere to about the degree enjoyed by our neighbours on the banks of the Loire, seven degrees farther south, without the great extremes of summer heat and winter cold to which they are exposed. In these days, therefore, of cheap glass, there is no reason why every house, suburban or country, should not have its glass house proportioned to its size; and we shall be able to show that an additional rent of 7½ per cent. would amply repay any landlord for the necessary outlay.

654. There are some few points which should influence the choice of a site for every kind of plant-structure, the first and most important being, that it is not overshadowed on the south, east, or west, or exposed to the drip of trees or houses in any direction. A lean-to house, which, however, is the very worst form, may have any aspect between south and south-south-east; south, inclining a point or two to east, being the best; as it receives the early sun as it gradually rises, without being exposed to its full meridian glare. The span-roofed house would probably be well placed which ranged from north-west to south-south-east also: it would thus receive all the morning sun on one side, while the other would receive the meridian sun slightly oblique, and all the afternoon sun, varying according to the angle of incidence of the roof. This would also be the most favourable aspect for a ridge-and-furrow roof, whether it were supported against a back wall, or had a rectangular roof with vertical lights on each side.

655. Conservatories, however, which are appendages to the house, must depend, for their aspect, on the position it occupies, except where the principal rooms lie to the north. No plant-house can possibly prosper in this aspect, since the house shades it from the south sun; nevertheless, with these rooms it must be connected, or it fails in its object; and a passage or corridor connecting it, covered with glass, must lead to some locality, either to east, or west, or south, where a more genial aspect can be obtained for the conservatory. Where a glass corridor becomes necessary, either round the house, or as described at page 54, it should be made subservient to the objects of the conservatory by the introduction of baskets, trailing plants, vases occupying niches, and other attractions.

656. As regards its architectural style, the conservatory should, at least, be in harmony with that of the house: if ornaments are permitted, they should be Gothic, Tudor, or Grecian, according as the house is of one character or the other: in this, as in all other matters, congruity is to be studied.

657. The conservatory, properly speaking, is a house in which the plants occupy beds and borders as in the garden, but on a smaller scale: sometimes the plants are permanent ones, more frequently they stand in pots plunged into the soil, or in tubs standing on its surface, or in vases occupying pedestals. Much has been written on the arrangements of conservatories, and Mr. Noel Humphreys has propounded some ideas for their picturesque arrangement which would have a very pleasing effect in a house of sufficient size. We shall confine our remarks to smaller limits, however, and follow the erection of a house, with some alterations, which has been described by the late Mr. Loudon, in his "Encyclopædia of Architecture," which that judicious author considered admirably adapted for a small country mansion. The house is Gothic in style, 43 feet long and 18 feet wide, having three folding-doors opening on the



11.—GROUND-PLAN AND SECTION OF ROOF.

grounds, and two communicating with the house; one, namely, with the library, and the other with the drawing-room; the south end being octagon-shaped, with three sashes; one similar sash and a door bringing the house flush with the south-east wall of the house. These sashes or vertical lights are 6 feet 8 inches, fitted into a frame and well secured by bolts on each side and at top: two other lights in the lower part of the same frame turning on an horizontal pivot at its centre, give the means of ventilating the house.

658. A beam 45 feet long occupies the centre of the house, supported by the end walls and three hollow pipes nine feet high: upon this beam the central rafters and lights of the roof rest. This beam is cut out so as to incline towards each of the supporting pipes, and covered with lead; thus forming a central gutter to collect the water from the roof, which is carried through the pipes into the tank by means of drains. Corresponding beams built into the wall on each side receive the waters on the right and left by means of similar hollow pipes, which serve at once the purpose of drainage and support.

659. The roof, which was rectilinear, or double-ridged, takes four sashes of $4\frac{1}{2}$ feet each, with broad gutters at each side and in the centre, and glazed with panes 4 inches by $5\frac{1}{2}$, the laps being $\frac{1}{8}$ inch, with putty between; the side-lights having glass 4 inches by $4\frac{1}{2}$.

660. As the house was laid out for beds and borders, the foundations of the beds *a* and *b* were dug out six feet deep and piers raised to support them: *e* is a tank six feet by four for rain-water, with perfect drainage for the overflow. A pump connected with the tank occupies the north-west corner, and the whole of the beds and borders are surrounded with stone kerbs; and the house paved, full-glazed, and painted, cost, at the old price of glass, £250.

661. The elevation of this house is not very attractive; the side-lights form a pointed arch, and the brick piers, as well as entablature over them, are heavy in appearance, and must have been ill-suited for the purpose. Cast-iron pillars in place of the piers, with a light moulded cornice, would have been a great improvement, as a matter of taste, besides being much cheaper, and adding a foot or 18 inches to the height and width of the side-lights. In this house ventilating-shutters were inserted in the roof nearest to the wall of the house. Under the improved system of building, Sir Joseph Paxton's system of ventilating-sashes would apply admirably in connection with the lower panes of the side-lights; or Mr. Messenger's patent ventilating-ridge, which opens and shuts very conveniently, by means of a rod and lever, working on an endless chain, as described in par. 687, may be applied with advantage.

662. The great house at Chatsworth is built on the ridge-and-furrow system, as it has been called,—a system by which acres of ground may be covered with the greatest ease. It consists of a number of small span-roofs joined together, so to speak; the length is $97\frac{1}{2}$ feet, the breadth 26 feet, supported by two rows of cast-iron pillars, one along the centre, the other along the front and ends. These pillars are placed $6\frac{1}{2}$ feet apart in the rows, are three inches diameter, and the front ones hollow, so as to admit a lead pipe, which carries off water from the roof into a drain in the gravel walk.

663. At the bottom of the iron pillars are sockets let into stone, giving firmness to them, and through this socket the lead pipe is carried into the drain. The height of back wall is 13 feet 6 inches at the lowest, and 15 feet at the highest part, or ridge of the angle; the front 8 feet 6 inches in the valley, 10 feet at the ridge or angle. The lights are fixed and angular, each 25 feet 6 inches,—front and side lights slide in a double groove; the centre row of pillars, 2 feet 6 inches longer than the front or end pillars. Two feet from the bottom of each a screw passes, to fasten the bearer which supports the central walk; another arched iron support on the top of each rises up to the ridge of each angle. The pieces terminate in small squares, which fix in a similar hollow left at the top of the pillars; into which they are fastened by means of lead run into the interstices. In each valley of the angles, two large screws are inserted into the styles of the light, to fasten them firmly. Air is admitted by sliding back the front sashes, and by ventilators in the back wall, which swing on pivots and open by means of long iron rods having holes forged and pins driven into the wall, regulating the air at pleasure. Over these a square of trellis-work is placed inside. The sash-bars are one-inch, and grooved to receive the glass.

664. In the ventilation of the forcing-houses at Frogmore, an iron rod, which works on brass bearings or chains, runs the whole length of the house about a foot from the wall-plate. On this shaft, opposite each light, is a brass pinion working into a toothed quadrant attached to the bottom rail of each light. This shaft is turned by a handle, when the quadrants are either thrown out or drawn in, and the whole light thrown open or shut to the extent required. In the back wall of each intermediate light is a ventilating-frame, which is opened or shut by similar apparatus: above these frames over the glass is a corresponding number of open gratings. Flues or chambers in the wall open into the flues at the bottom, while the grating covers the opening at top. When it is desired to thoroughly ventilate the house, the fan-lights being open, it is only necessary to turn the screw or worm, which is connected by the rod attached to the lever; and the lever being attached to the end of an iron shaft running the whole length of the house, the whole are thrown open at once.

665. "There are many modes," says Mr. Humphreys, "by which the conservatory might be rendered both picturesque and interesting, apart from the actual brilliancy of the flowers. The principal feature being to relieve the spectator, as far as possible, of the idea that he is walking under glass, I propose to do this by making the framework for receiving the glass of some irregular form, resembling the branches of trees or ribs of large leaves, such as the palms. This would greatly tend to encourage the illusion that the openings between the branches are not glazed." This Mr. Humphreys proposes to do by the introduction of a series of light iron arches, meeting at a centre, glazed with curved glass, giving the appearance of a succession of arches half-hid, half-seen through the rich foliage of palms and climbing plants; while ornamental basins and vases fill up the recesses formed by these light airy supports to the roof.

666. Through some of the darker recesses of the house a stream of tepid water might flow amid fragments of rock and boulders, in which aquatics and rock plants from the tropics might be displayed in their natural and wildest habits; while the centre of the building, instead of being choked up with tall shrubs and trees, is kept spaciously open; low-growing plants only being placed in the ground, as in a flower-bed, in the central compartment; while some of the finest Ipomœas and Bassiflora should occupy the central beds, trailing round the slight pillars, and forming a matted roof overhead, at once to give shade and conceal the artificial nature of the edifice, the side-walls being skirted next the glass by a bank filled with plants in flower, like those in the central beds; while seats of elegant design, either in stone, wood, or iron, are scattered at intervals amid groups of aloes, arums, and other odoriferous plants in the centre. Of course such a design as Mr. Humphreys has imagined would require considerable space for its development, and it would thus only be available in a house of considerable dimensions; but some portions of it,—namely, the arrangement of vases and rock-work, might be adopted with advantage for growing ferns and some of the less delicate orchids, even in a small house.

§ 2.—GREENHOUSES, HOTHOUSES, FORCING-PITS.

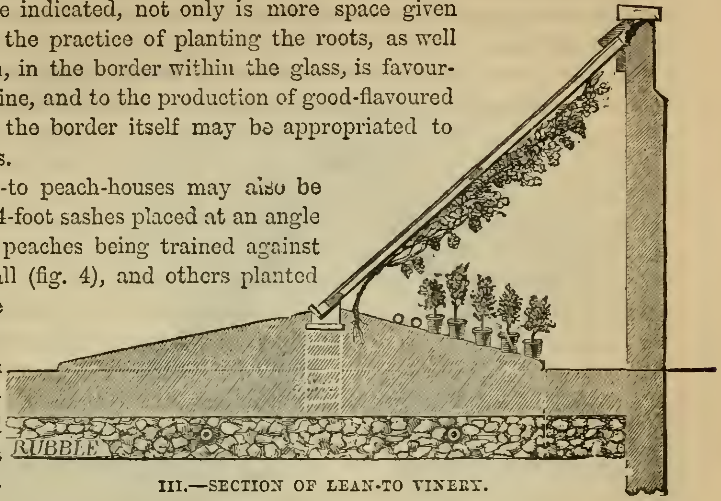
667. Sir Joseph Paxton, to whom horticultural science is so much indebted, has invented and patented a system of hothouses at once economical, efficient, and, above all, portable. These houses are both lean-to and span-roofed, and require no masonry or brickwork beyond the piers necessary to support the wall-plate, which is so contrived as to form at once the gutter and groove in which the sashes rest, the plate being grooved so as to agree with the angle at which the sashes are to be placed. The sashes average in width about 4 feet 6 inches, varying in length from 8 to 16 feet; the styles and sash-bars being proportioned to the length, inasmuch as, there being no rafters, the bars and styles supply the place of both, and must, consequently, be sufficiently strong: they are bolted together at the top and bottom.

668. The ventilation, which is the subject of a patent, consists of a smaller sash, nine inches wide, between each pair, and extending the whole length of the sash, but divided in the centre, the upper half folding upon the lower with a slope, so as to throw off the water. This narrow sash is hinged to the adjoining one, and bolted to the other by a spring when closed. These ventilating-sashes may either be worked by an iron rod and pinion or by the hand.

669. The portability of these houses is a great recommendation, where a tenant is building a house on ground of which he has only a short tenure, inasmuch as they can be entirely removed in a few hours, without causing any dilapidation or interfering with the rights of landlords.

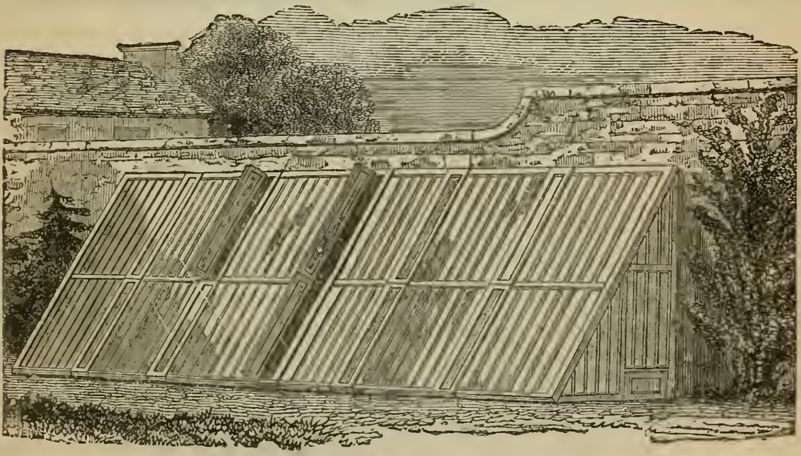
670. The purposes for which these structures are adapted will be better

understood from the following sections of houses, and their description. In fig. 3 we have a lean-to structure, placed against a wall at an angle of 45° the sashes being 14 feet. By raising the border in the manner here indicated, not only is more space given within, but the practice of planting the roots, as well as the stem, in the border within the glass, is favourable to the vine, and to the production of good-flavoured fruit, while the border itself may be appropriated to vines in pots.



III.—SECTION OF LEAN-TO VINERY.

671. Lean-to peach-houses may also be formed by 14-foot sashes placed at an angle of 40°; the peaches being trained against the back wall (fig. 4), and others planted either in the front border, standing in pots, or partially trained upon a front trellis, according to the taste of the cultivator. This style of building requires no rafters, framework, or other erection, excepting the fixing of the wall-plate in a bed of concrete, at the required angle. A lean-to pinery is formed by laying 14-foot sashes at a proper angle, and arranging the border to suit them.

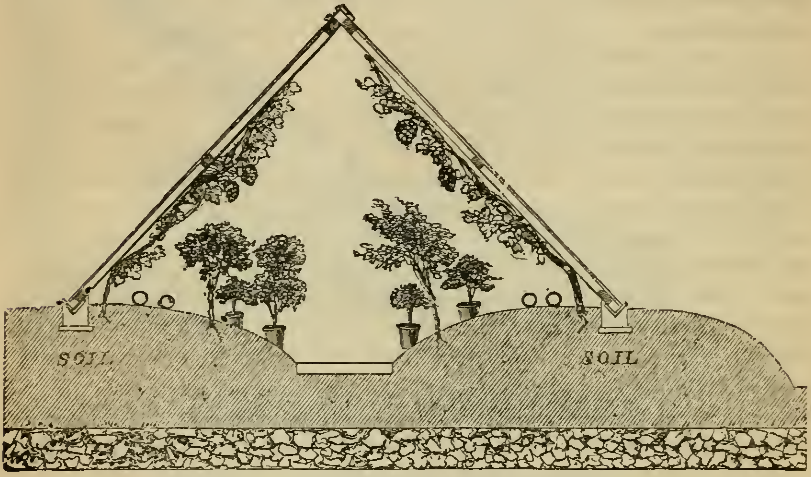


IV.—ELEVATION OF LEAN-TO FRUIT-HOUSE.

672. A span-roofed house composed of 10-foot lights, at an angle of 45° gives an internal width of 14 feet, and forms an excellent vinery and fruit-house; the border, both inside and out, being raised as shown in the

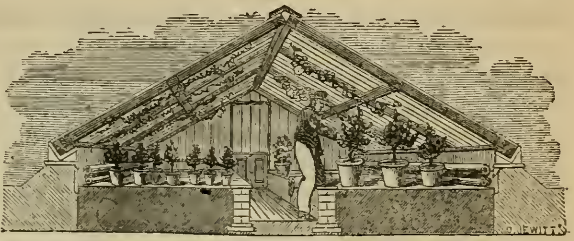
engraving at the head of this chapter. Here the border outside the house has been raised so as to be flush with the wall-plate, which rests on piers, or, if the ground is sufficiently solid, the saddles rest on a concrete bottom: the border is prepared for the reception of the several trees or vines intended to be grown in it.

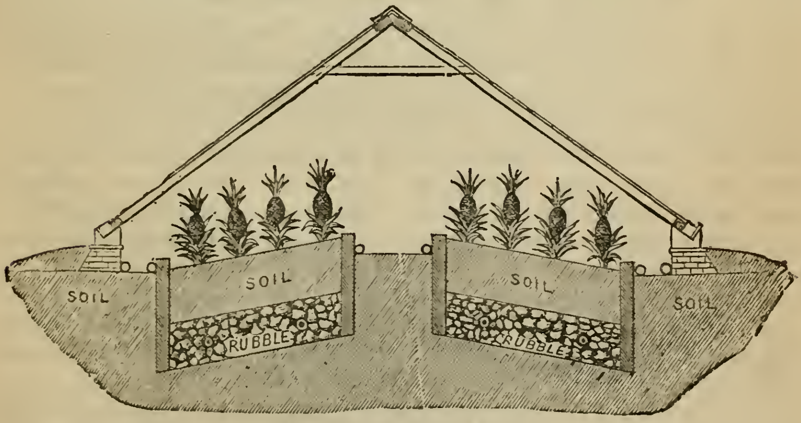
673. The house (fig. 5), however, which Sir Joseph Paxton specially commends to public notice is span-roofed, consisting of a range of 14-foot lights, set at an angle of 45°, which gives an internal width of 19 feet 9 inches; and, by raising the borders about four feet above the ground-level, as represented in the engraving at the head of this chapter, a handsome, lofty structure is formed, capable of producing excellent crops either of peaches, plums, figs, or cherries. In a house of this description, Sir Joseph Paxton informs us that he has grown a splendid crop of St. Peter's grapes, which have been ripening in succession since October, and will continue to do so till March, with no more artificial heat than was necessary to keep out the few degrees of frost we have had; the house being placed, however, as we understand, under a most favourable aspect, ranging from north-west to south-east, and on the mild southern slopes of Sydenham, so that each side of the house catches its share of the sun's rays for an hour or two daily, even in mid-winter. The vines are trained on wires, near the glass; while standard peaches, plums, and figs, may be planted on each side the central walk at intervals, and dwarf trees may be planted nearer the glass, according to their size. The standard trees will spread their heads over the centre of the house; and, if left to their natural growth, with only the necessary pruning to admit the light to the centre of the trees, the result will be productive crops; and, under judicious management, success will be certain. Fig. 5 represents a house consisting of 12-foot lights placed at an angle of 40°, which gives a width of 17 feet, with



V.—SECTION OF VINERY AND PLANT-HOUSE.

the trees arranged as an orchard-house, and planted in the soil of the border.


VI.—SECTION OF PIT FOR BEDDING-OUT PLANTS.



VII.—SECTION OF PINERY.

674. Eight-foot lights, when placed at an angle of 30° or 35°, as in fig. 7, make an excellent house for sheltering bedding-out plants, and, with suitable heating apparatus, would form an admirable cucumber or melon-pit. The only arrangement necessary would be to dig out the soil three feet below the ground-level, to give head-room ; then lay down half a foot of rubble, for drainage, and fill up to the surface with good sandy loam, leaving a central path three feet wide. If this border is made outside as well as in, very good grapes may be grown while giving shelter to the bedding-plants, by using the ventilators adapted for wintering the vines, and admitting them after they have ripened their wood outside. Or these houses may be employed for small greenhouses by placing them on side-walls from two to three feet high, instead of sinking for a path, and placing flat stages on each side over the pipes on which to stand the pots, &c. ; and for the pot-culture of strawberries this arrangement answers extremely well. Peach and other trees in pots may be grown when the stages are dispensed with, and thus a very cheap and efficient orchard-house on a small scale may be formed. Ten or 12-foot lights placed at an angle of 35° give a favourable form of pine-pit: the one gives a width of 16, and the other of 19 feet; and if a sunk walk of three feet wide occupy the centre, and a foot

and a half at each side, near the glass, is allowed for the hot-water pipes, there will be room left for two good pits (fig. 6).

675. It is very obvious that, besides these specific uses to which the invention can be applied, it is applicable to almost every variety of gardening structure. The glass used is 16 oz. to the foot, and the sashes are made of the best red deal, well seasoned. By using in succession the 12-, 14-, and 16-foot lights, an extensive range of houses suited to every cultural purpose is formed. They are equally available for the side and top lights of a conservatory, in connection with the ridge-and-furrow principle of roof, in which the system of ventilation would be sufficiently effective.

676. In houses of great length, all the ventilators on one side can be opened at once from one end of the house to the other, by a very simple contrivance. This mode of ventilation has the advantage of avoiding all draughts of wind; for if it is blowing on one side, the opposite ventilators can be opened. When the temperature is very hot, perfect circulation of the air is obtained by opening the ventilators on both sides.

677. The following are the prices of a few of these houses, which we give merely as an example of the whole. A lean-to house, painted with three coats of good paint, and glazed, costs, according to the length of house and height of sash,—

Length.		8-foot Lights.	10-foot Lights.	12-foot Lights.	14-foot Lights.	16-foot Lights.
20 ft.	7 in.	£12 0 0	£16 0 0	£28 0 0	£28 10 0	£34 5 0
31	3	16 10 0	21 2 6	26 10 0	37 12 0	45 16 0
41	11	20 18 6	26 18 6	33 7 6	46 14 1	57 7 0
73	11	34 12 6	43 15 0	53 7 6	74 0 0	92 0 0
105	11	48 17 6	60 12 6	73 10 0	101 10 0	126 13 0

Span-roofed houses, with water-troughs, doors, and ends, complete :—

20 ft.	7 in.	£24 0 0	£32 0 0	£42 0 0	£57 0 0	£68 10 0
31	3	33 0 0	42 5 0	53 0 0	75 4 0	91 12 0
41	11	41 16 0	53 17 0	66 15 0	93 8 0	114 14 0
73	11	69 5 0	87 10 0	106 15 0	148 0 0	184 0 0
105	11	97 15 0	121 5 0	147 0 0	203 0 0	253 6 0

These prices neither include carriage, nor the cost of erection, which, of course, both depend upon distance, and other considerations. Any further particulars will be furnished by Mr. Hereman, 7, Pall-Mall East.

678. The erection of these houses is startlingly simple, and one of their great recommendations: the sashes being all made to an exact measurement, each one is alike available. The site and the plan of the house being settled, if it is to have a made border outside, a sufficient space of ground is excavated to the necessary depth, and a setting-out rod prepared, which must be of the length of the intended house. This rod is laid on the ground, and on it the exact width of each sash, which will be either 4 feet 7 inches or 4 feet

8 inches, and a ventilator, is laid out, allowing space for an iron bar gauge, which connects each sash with the other, and receives the ventilating-sash between, for which nine inches are required. Having marked the space required for each sash, gauge-bar, and ventilator, proceed to transfer corresponding marks to the ground: the marks thus made are the centre of a series of piers of brick or stone, each 14 inches square, and equidistant, if a lean-to house, from the back wall: if a span-roofed structure, the same is to be done for the opposite side.

679. These piers, if for 16-foot sashes, will be better if made 18 inches thick, and built buttress-fashion; that is, sloping outward to their base, so as to bear better the thrust of the sashes. When the piers have settled sufficiently, the saddles are fixed on them, in a bed of cement.

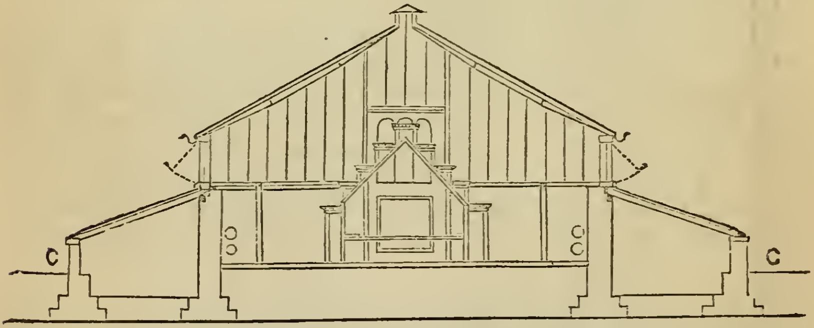
680. The saddle consists of a block of wood fitting on the piers, the upper surface of which is cut to an angle according with the angle of the house. Upon this saddle another angular frame of wood is placed, which fits the angle of the saddle, and runs along the whole range of piers, performing at once the office of wall-plate, gutter, and support to the sashes: for the upper surface is a hollow angle, receiving the lower ends or horns of the sashes, while it is so set on the piers as to have just sufficient inclination to carry off the water to a pipe at the lower end. All the lengths necessary to connect this gutter are joined over the saddles, the joints being made water-tight either by putty or cement, and pitched inside and out.

681. In lean-to houses, the top of the sash simply leans against the wall, being bevilled to fit it: they may be covered with cement, or not; but in span-roofed houses the sashes are bevilled so as to support each other at the proper angle, and a pair of strong iron hinges sunk into the wood, and screwed firmly to the styles of each sash, keep them in their proper place: while a ridge or coping of wood, fitting them exactly, covers the whole, and is screwed on to the top rail of the sashes, fitting closely to the upper ends of the ventilators when closed; for these, like the cap, are raised above the surface of the sashes.

682. The ventilators, consisting, as we have already explained, of two smaller sashes, each one half the length of the lights, and nine inches wide, are hooked on to the left-hand style of each sash by two hinges, the hook being screwed into the style, and the eyes into the lower part of the ventilator, lapping over the right-hand style of the adjoining sash. A stay opens both ventilators at once when required, or the upper ventilator alone may be opened. The upper ventilator falls into the lower by a sloping bevilled edge, and both are hooked together by a hook-and-eye on the lower surface. A small piece of wood sliding in a groove made in the side-styles of the sashes, protects the house from drip, and the water is carried off into the gutter below by grooves on the upper surface of the styles of the sashes. The ends are fixed under the styles of the outside roof-sashes, and secured to each other by means of cross-plates let into each, and firmly screwed up; the doors being hung in the usual manner, and opening to the right or left, or inside, as may be desired.

683. The cap or ridge screwed on, and the ends properly fixed, it only remains to replace them with such borders as are considered suitable for the trees or plants to be grown in them. The soil of the border, both outside and in, should be flush with the level of the gutter or wall-plate, so as to exclude the external air; and it should slope outwardly so as to throw off moisture. With these observations we dismiss a very efficient and inexpensive style of horticultural building.

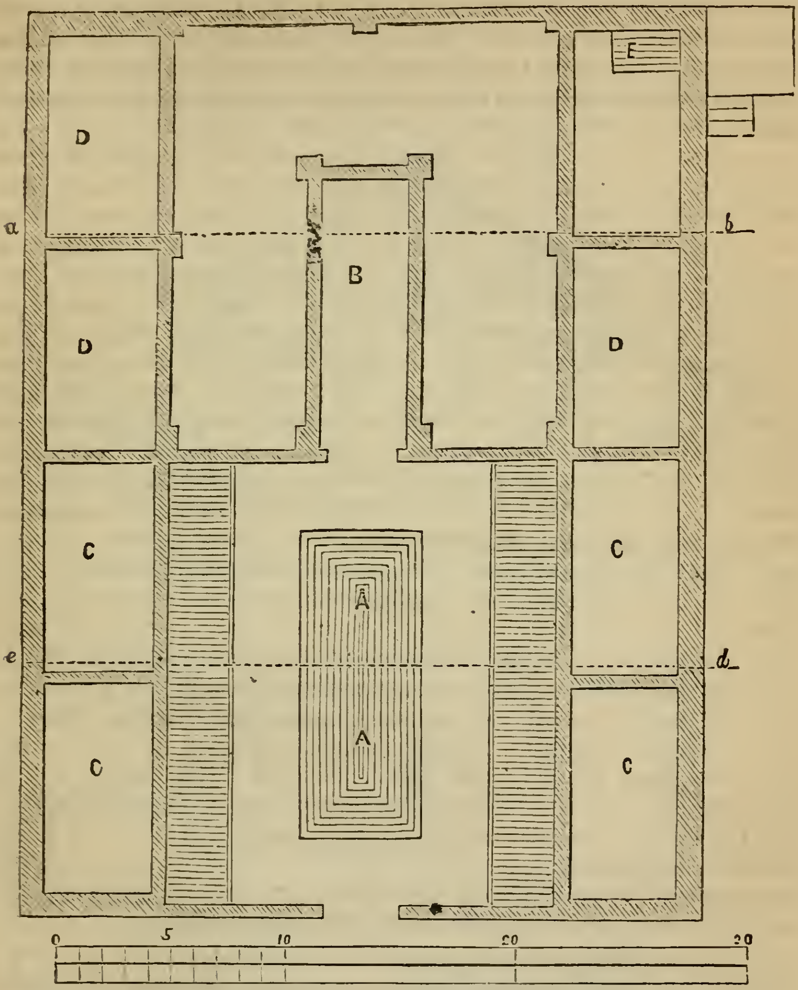
684. Practical men consider these houses admirably adapted for fruit-cultivation and vineries, or, indeed, anything that requires training parallel with the glass. For potted plants, or shrubs requiring head-room, some consider them objectionable and difficult to manage, the roof springing from the soil of the border rendering it difficult to get at the plants at the sides. This is a well-founded objection, and as the whole argument in their favour is involved in this feature, which gives simplicity and economy to their erection, it is probably calculated to limit their use to vineries, and very narrow fruit-houses requiring an acute inclination. The simplicity of their structure, and the ease and rapidity with which they can be put up and removed, will recommend them to many who hold their houses on short or uncertain tenures; while the fact that the side-styles and sash-bars are undoubtedly of the best material, and of a strength calculated according to their length, will recommend them as preferable to any make-shift systems.



VIII.—SECTION OF GREENHOUSE AND COLD-PITS.

685. In the construction of horticultural buildings there is no economy inferior workmanship applied to the first erection. While we point out the various kinds of structure and the most approved modes of erecting them, with some approximation to their cost, it is not to be doubted that the course to be pursued by any person desirous of erecting horticultural houses, would be to get proper estimates for the work after specification of the attendant circumstances. In order to facilitate any such application, we have asked Mr. Messenger, horticultural engineer, Loughborough, to furnish a design and estimate for a range of houses, including forcing-house and green-house, each 20 feet by 18 feet; four forcing-pits, and a like number of cold-pits, with his several patented appliances, which we now submit to our readers.

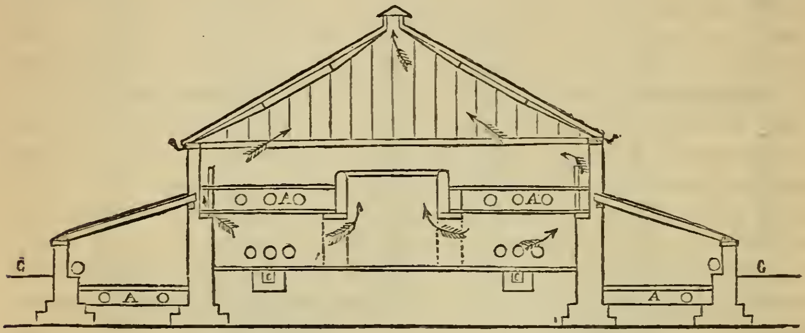
686. In a range of buildings like the present, in which pits occupy both sides of the houses, it is obvious that the nearer they range from north-west to south-east, the more equally will the light and heat of the sun be distributed to them. The site being fixed upon, Mr. Messenger's estimate includes the foundations, walls, and air-drains: external drains, of course, are contributed by the proprietor. The walls of the greenhouse and forcing-house are three feet below the ground-level, and three feet above, of nine-inch brickwork. The greenhouse is paved with stone, having a central stage and vacant space all round: the forcing-house has a central path four feet wide. Tanks for



IX.—GROUND-PLAN OF HOUSES AND PITS.

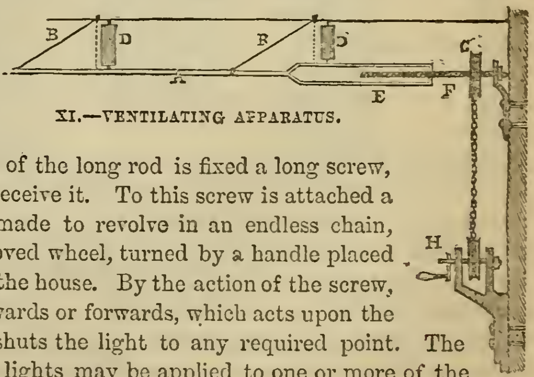
AA. *Plan of Stage.* B. *Central Walk.* CC. *Cold-pits.* DD. *Hot-pits.*

bottom-heat, over a border of seven feet wide, on each side. The north-eastern extremity may be so arranged as to present a combination of exotic ferns and orchids; for which, by the aid of a water-tank, a perfectly congenial atmosphere may be supplied here; and by building up the further end of the house in rock-work, the whole width of the house, and opening a communication with the tanks on each side, any amount of moisture may be obtained; and by placing a concealed cistern above the level of the rock, and over the boiler, silvery streams of warm water may be made to trickle over the tortuous track of rock-work, terminating, perhaps, in a miniature water-fall, or supplying a miniature fountain under other arrangements.



X.—SECTION OF FORCING-HOUSE AND HOT-PITS.

687. Upright or side-lights, two feet high, run the entire length of each house, and are made to open and shut by means of a rod of iron, which runs the whole length also. To this rod are attached shorter rods at intervals of four or five feet, with joints; the other end of the shorter rods being attached to the lights, both ends of the short rod working on a joint. To one end of the long rod is fixed a long screw, working in slings made to receive it. To this screw is attached a grooved wheel, which is made to revolve in an endless chain, acted upon by another grooved wheel, turned by a handle placed in some convenient part of the house. By the action of the screw, the long rod is drawn backwards or forwards, which acts upon the short rods, and opens or shuts the light to any required point. The same system of raising the lights may be applied to one or more of the lights, or to the whole, as may be necessary.



XI.—VENTILATING APPARATUS.

688. The system of ventilation adopted by Mr. Messenger will be better understood by reference to the diagram, in which BB are short rods, connected with the sling A at one end, and the lights at the other. The dotted lines, D, represent the upright divisions which support the roof; E, the screw-slings, in which the screw F is to work; G is a grooved wheel, in which the

endless chain is to work and turn the screw, in fact, this is its axis. The handle H is fixed to some convenient place on the front wall, being the mover of the whole apparatus. As the rod is moved from right to left, the short rods push the lights up and admit fresh air as they are acted upon: by reversing the screw, the opposite result is obtained.

689. The ridge-ventilation is obtained in precisely the same manner; the lights under the coping being pushed out or drawn down by turning a handle attached to a long endless chain on the end wall.

690. The result of this system, to use Mr. Messenger's words, are,—1. perfect ventilation; 2. non-interference with the plants; 3. no risk of broken glass by the lights fallen down; 4. keeping out rain when the lights are open.

691. The roof Mr. Messenger makes of very light rafters, only three inches by two, strengthening them by means of a tension-rod placed under each, as shown in the engraving. These are firmly fixed at each end, and kept extended by means of two iron rods fixed in the rafters at equal distances from each other, and from the extremities. Between these rafters sash-bars are placed, which, when glazed and painted, are perfectly waterproof, and extremely light and elegant in appearance; the tension-rods being both graceful, and the rafters light and airy, and strong enough for every purpose required. To his other patents, Mr. Messenger has added a new principle of glazing for greenhouse and other roofs which is perfectly waterproof and air-proof also without putty. With this invention the roof may be nearly flat; thus effecting a great saving in material, no paint being required in connection with it.

692. The system of glazing patented by Mr. Messenger is simple and ingenious: the upper surface of the sash-bar, of which we give a section, is an open gutter, and the glazing is performed by bending the edge of the glass over the edge of the gutter. The accompanying engravings will make more clear the principle of this mode of glazing. The gutters are made of either lead, copper, zinc, or iron, or the sash-bar itself can be made with a gutter on its surface. The mode of securing the glass down to the gutter is shown by the section fig. 12. It is done by a screw passing through a brass plate and India-rubber, into the wood or metal bar; the India-rubber pressing slightly upon both sides of the glass, keeps it in its place. If the glass is very heavy, zinc or copper clips are used to prevent it slipping down. Fig. 13 is a plan of the roof, showing the brass plates and shape of glass, which is so arranged as to convey the condensed vapour as well as the external rain into the internal gutter, whence it escapes by a gutter attached to the wall-plate.

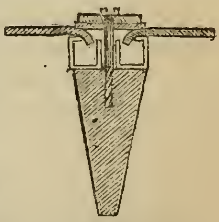


Fig. XII.

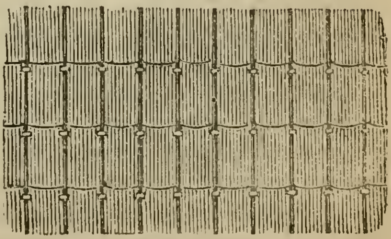


Fig. XIII.

693. The cold and forcing pits are, of course, constructed on the same

principle: the whole range is 26 feet wide,—supported by brick walls sunk three feet under the ground-level. The hot pits are supplied with bottom-heat by means of tanks and hot-water pipes, the lights being formed of the ordinary sash-bars, glazed.

694. The following estimate Mr. Messenger authorizes us to publish, as his price for such a range of houses as we have described, assuming brick-work and other material to be the same as in his own neighbourhood, and exclusive of carriage; but, of course, such an estimate can only be taken as an approximate one in many of its details.

Cost of Sections of range of Greenhouse, &c.

	£.	s.	d.
whole of the brickwork, including floors, pit-walls, air-drains, &c.	38	0	0
The whole of wood-work required	59	0	0
Glazing the whole with 15-oz. glass	23	0	0
Painting both sides four times	14	0	0
Patented Ventilating-apparatus	8	0	0
,, Boiler, with furnace and setting complete, with stoke-hole	13	0	0
Hot-water pipes, bends, vapour-troughs, siphons, &c., and fixed complete	76	0	0
Slate tanks, and interior fittings for forcing-house	25	10	0
Stages and fittings for greenhouse	6	10	0
	£263	0	0

695. Our space does not permit of these remarks being extended, nor is it necessary, as few persons will be disposed to build hothouses without proper plans and estimates, and we can only hope to be useful in pointing out some of the necessary steps to be taken.

§ 3.—Warming and Ventilating.

696. In no department of industrial art has more ingenuity been exercised than in applying heat, whether it be to houses or horticultural buildings: stoves, furnaces, and boilers, endless in form and principle,—hot air, hot water, and steam, have, in turn, been adopted, approved, and superseded; tubular furnaces, tubular boilers, in an endless variety of forms, have been invented, sometimes with most satisfactory, at other times with doubtful results; and we shall probably be approximating to the truth in stating that while all have had, and have, their advocates in the gardening world, no mode of heating is so universally approved as hot water circulating in iron pipes, with bottom-heat supplied from tanks heated by the same means. Even to this cleanly and convenient form of heating, however, there are objections: something is wanted that shall simulate the ammonial gaseous qualities of the vapour arising from hot dung, in which plants seem so to revel; and various expedients are adopted, by which this is partly attained. Mr. Fleming has introduced into the

hot-water tanks at Trentham a mixture of pigeon-dung, in the proportion of an ounce to a gallon of water, to supply this desideratum to vegetation: others attain their object by watering the pots and beds with manured water, in varying proportions, according to individual judgment. Mr. Beaton suggests the application of vapour impregnated with tobacco or sulphur for the destruction of insects; while Mr. McIntosh recommends guano, pigeon-dung, and urine, used in the same manner by means of evaporating-pans attached to the pipes, in order to attain the fumes of the old-fashioned dung-bed, "so pre-eminently valuable for the restoration of sickly plants, and for promoting the vigorous growth of healthy ones."

697. We are indebted to the Dutch for the earliest edifices warmed with artificial heat, as for initiation into many other gardening secrets. Their early trade with the East developed a taste for flowers as early as the fifteenth century; and they soon found that their cold moist atmosphere was unfitted for the successful culture of the delicate plants even of the Levant. They erected houses for their reception, therefore, which they heated with the common earthenware stove of the country, equalizing the heat by earthenware pipes carried round the room. In course of time other countries adopted the idea,—in our own country by means of open fires outside the building, with connecting flues going round the house inside the walls; and there are not wanting, even now, gardeners who assert that as good crops of grapes were and are grown by these flued walls, as can be produced by the modern innovations of hot-water pipes. The invention and application was, however, a great discovery for horticulture; and, accordingly, the names which are identified with it are both numerous and eminent in their art. Our space will only permit of our describing the principles on which the system acts, and name a few of the leading inventions in general use.

698. The principle upon which hot water circulating in pipes is applied to warming houses is, that the hot water has a tendency to ascend, and to fall as it cools; the denser cold fluid displacing the more rarefied. This principle has been extensively applied to warming public and other large buildings; distance from the furnace, and height above the boiler, being no obstacle to the circulation of the fluid, the boiler being placed at the basement, while a water-box is placed at the top of the building, both being hermetically sealed. A flow-pipe connects and carries the hot water from the boiler to the water-box. After passing through it, the water descends again by the return-pipe, and by its greater density displaces a like amount of hotter fluid on the surface. A supply-pipe, regulated by the ordinary ball-cock, admits cold water into the water-box to replace that withdrawn by evaporation, while safety-valves, placed on the boiler, guard against too great a pressure, from the expansion of the water. This principle is precisely that applied in heating horticultural buildings by hot water; but as it is seldom necessary to raise the water for this purpose, the amount of heat required is lower. Each hundred feet of 4-inch pipe contains 544 lbs. of water, and will require 14 lbs. of coal to raise its temperature to 180°. In a well-constructed boiler the water will lose 60° of heat

hourly, and 200 cubic feet of air are heated 1° per minute by every foot of 4-inch pipe: it is easy, by cubing the contents of the building to be heated, and dividing it by 200, to calculate the quantity of pipe required to heat the building to the required temperature. When the required temperature is 60°, the divisor should be 30; where it is to be 75° or 80°, 20 will be nearer; making allowance always for loss by ventilation, and the radiating power of glass, which is about one degree for every square foot and a half, and bearing in mind also that where smaller pipes are used, the body of water is smaller, and, consequently, the friction greater; for instance, in 2-inch pipes the difference of temperature between the flow and return-pipe will be four times greater than in a 4-inch pipe. In order to increase the rapidity of circulation, and equalize the temperature, Mr. Rogers proposes, when 2- or 3-inch pipes are used, that they should have a uniform rise of an inch in 20 feet, while in 4-inch pipes they should fall from the boiler in exactly the same proportion; for the velocity of circulation depends upon the difference in weight between the ascending and descending columns. Now the greater the height of these columns, the greater is the difference in their weight and in the velocity of circulation, and the higher the mean temperature of the pipes.

699. The inventor, or rather discoverer of the theory of the circulation of hot water, M. Bonneman, of Paris, had a calorifère so regulated that he could maintain a temperature scarcely varying half a degree of Réaumur, being regulated by the unequal dilation of metals. A rod of iron, screwed to another of brass, was inclosed in a lead tube terminating at its upper end in a ring of brass; the leaden tube was passed through the water in the boiler, by the side of one of the circulating pipes, and the dilation of the lead being greater than that of the iron, and the rod being inclosed within the lead, it was less heated; and the consequent lengthening of the leaden tube brought the brass ring into contact with a claw at the short end of a bent lever; the slightest increase of heat lengthened the tube, and pressed down the long end of the lever, and a wire connected with it opened or closed a valve, regulating the air admitted to the furnace; this, however, is a refinement on heating which is rarely practised or required.

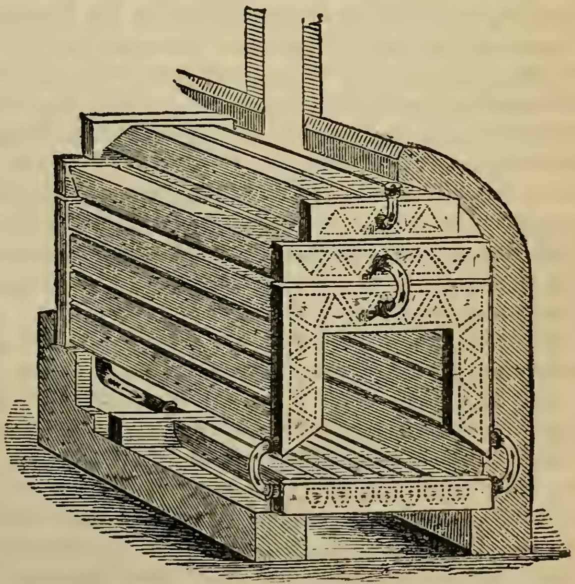
700. Warming by steam is more expensive than by any other process, and rarely practised except in manufactories where it is used as a motive power.

701. The first successful attempt to introduce warming by means of hot water in this country seems to have been made by Atkinson. His idea is founded on the theory of fluids finding their level; for his first apparatus was merely a boiler, from which the water was made to flow and return by means of two pipes on a perfect level. At the extremity of the pipes a reservoir was considered necessary, exactly on a level with the top of the boiler, the reservoir being covered with an iron top, fitting into it with a flange; the boiler with a wooden one. Mr. Atkinson afterwards constructed boilers with closed tops; by which means he carried hot water 30 feet above the level of the boiler. An improvement upon this system of heating was attempted upon what was called the siphon principle. In an open boiler, the flow-pipe being

placed a few inches below the surface of the water where it is hottest, the lower, or return-pipe, descending nearly to the bottom of the boiler, a small tube or air-hole being placed in the upper pipe near to the bend at its highest elevation; the surface-water being the hottest, the heated particles are forced into the upper pipe, after dispelling the air, get cooled, and descend again into the lower pipe by the force of gravitation.

702. Numberless modifications of these principles have been proposed at various times, the chief modifications being in the form of the boiler. After many experiments, Mr. Rogers was led to adopt a conical form of boiler, in place of a cylindrical one, the interior or furnace resembling in shape the sugar-loaf cone, supplied with coal from below. The boiler is also slightly conical. Cottam & Halen, and Burbidge & Healey, have each of them produced boilers extensively in use among gardeners; the object in both instances being to present the largest surface of the boiler to the flames; and both, though by different arrangements, carry the flame up the centre of the boiler. Mr. Thompson, of the Whitton Nursery, Hounslow, has invented a boiler which presents an immense surface to the action of the fire, and, from the mode of setting, admits the flame to play all round it, having projecting shoulders to extend the surface so exposed.

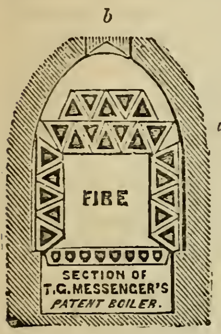
703. Where great heat is required, however, from moderate space, the tubular boiler seems to have considerable advantages. Messrs. Weeks, Fowler, and Kewley seem to have been the earliest adapters of this system, now extensively used in horticultural buildings. Weeks seems to have adopted, and even patented, the well-known principle of the displacement of rarefied water by the pressure of the denser cold water, already explained; but his heating principle was a system of pipes placed round the fire, and communicating with the cistern, and with the warming-pipes. This he did at first in connection with a boiler; but the tubes were soon found to be perfectly efficient when ranged round the fire without any boiler. This apparatus is now constructed of upright



ELEVATION OF MESSENGER'S BOILERS.

tubes placed over the fire, and united together at top and bottom, the furnace-bars being hollow tubes, through which the return-water passes before entering the upper part of the boiler ; thus producing very rapid circulation, with great economy of fuel.

704. The last, and, as we are informed, not the least effective of the tubular boilers, is that patented by Mr. Messenger, and by which he proposes to heat the range of houses we have described in the preceding pages. The principal feature of this boiler, of which we give an elevation on the preceding page, and of which this is a section, is an arrangement of triangular tubes, round which the flames play in passing to the flue *b*. The tubes are horizontal, and placed over and round the fire, so that the heat in its upward course rebounds, as it were, from tube to tube ; so that before it reaches the flue all the latent heat is expended. The furnace-bars are also tubes, through which the return-water passes ; thus preventing them from burning, and increasing the rapidity of the circulation, and re-entering the tubes which form the boiler at a high temperature. It is obvious that the surface exposed to the action of the fire in this boiler is immensely increased by the form of the tubes. The boiler-surface entirely surrounds the flames, while, from its horizontal position, sufficient space is allowed for between the fire and the tubes for the introduction of atmospheric air, and the proper commingling of the gases ; *a* being the brick setting round the boiler, *b* the flue through which the smoke escapes after passing round the tubes. The large surface of triangular bars exposed to the action of the fire, which in fact form the boiler, and through which water circulates, renders it, according to Mr. Messenger's statement, at once economical in its consumption of fuel, as well as highly efficient in its heating qualities ; while the facilities for cleaning it are such that it can be done at any time without interfering with its working. Besides its economical properties, neither the tubes at the sides and over the fire, nor the furnace-bars under it, can be injured by the heat, as the water inside keeps them cool, and consequently protects them from its action.



705. The hot-water pipes are, of course, applied to the boiler by means of flanges, and the pipes themselves are of the usual circular shape, and of sizes calculated according to the superficial contents of the house to be heated and temperature required. The tanks are to be heated by a flow and return-pipe passing along their surface, at the level of the water, while a current of fresh air from below keeps the house pure and wholesome ; at the same time the air is heated in its progress to the temperature of the tanks. The only novelty introduced here consists in an exceedingly simple shutting-off valve which Mr. Messenger has patented, by which the circulation of the water can be cut off or introduced into any house or pit it is desired to keep at a higher or lower temperature than the others. These valves are said to be very

simple, thoroughly effective, never get foul, and very durable; the prices being, for 2-inch pipes, 16*s.* 6*d.*; for 3-inch pipes, £1. 1*s.*; and for 4-inch pipes, £1. 5*s.*

706. The system of heating houses by hot-water pipes was long objected to, as most improvements are. Probably the inefficiency of heating power, at first, was at the bottom of most of these objections; but the same objections have never been raised to the various modifications of it applied to heating tanks and gutters. These inventions supplied the gardener with many of the fertilizing results he had been in the habit of obtaining from the old dung-beds: he could obtain moisture, and, by mixing manure in his tank, he could obtain much of the old ammoniacal essence along with it. He was also enabled to obtain greater uniformity of temperature, for the mass of water contained in the tank was more easily retained at a regulated temperature than could be done in the pipes alone. Mr. Rendle, of Plymouth, has perhaps done more to introduce this system of heating than any other person.

707. Mr. Rendle recommends tanks of yellow deal, and eight or nine inches deep, for the purpose. They should be made thoroughly well-jointed, as the brewers' backs are made with 2-inch deal, and made water-tight by red lead, or lining with lead, and placed upon piers, at the required height; over the tank placing closely-fitted covering of slate. Through the tank, either by means of elbow-joints, or by perforations in the tank, to be sealed up again by cement, the flow and return-pipe should pass with a sufficient coil of pipes to secure the degree of heat to the water which is required. The supply of water, of course, must be regulated by a ball-cock, and the usual measures taken to prevent damage by over-flow, by the use of a waste-pipe. Such a tank, coated with lead, would, of course, be more enduring, but not more efficient for the time. It will be obvious that the tank would only perform half the duty we have assigned it, if it did not, by some contrivance, give out some of its heat and moisture to heat the atmosphere of the house, and dispense the necessary vapour and moisture; but it may also be necessary to have a coil of pipes available for this purpose, independent of the tank, with a stop-cock attached, to turn the hot water on or off at pleasure. Perhaps the most efficient range of tanks are those fitted up by Mr. Rendle for Messrs. Veitch & Son, of Exeter, the description of which we quote from the *Gardener's Chronicle*, as supplied by Mr. Veitch, jun.:—"This tank," he says, "is formed of brick arches, worked in cement, with brick sides; the whole well coated with cement. The top is of slate, cemented down; the sides of the beds are of brick-work. The material used for plunging is a clear sharp sand, which we find retains the heat for a considerable time. In one part of the bed we have put soil, in which the cuttings planted out have rooted most rapidly. The heated water is regulated by means of a division at the end of each house, through apertures in which communication is preserved by a short piece of 4-inch pipe, having plugs fitted into them. By this simple means one end, or the half of one end only, may be heated, or each bed may be regulated to a different degree of heat."

This house is 51 feet 9 inches in length, 11½ feet wide, and 6 feet 9 inches high under the ridge.

708. Much as it has been approved by the best practical horticulturists, the tank system has its objections, which we find stated in the *Gardener's Chronicle.* "It is well known," the writer remarks, "that by means of a flow and return-tank, the degree of bottom-heat in the pits can be very steadily maintained. Once the mass of soil on the beds is heated to the required pitch, very little is required to keep it up, and sudden changes of temperature do not much affect it: even such extremes of external temperature as 55° one night and 25° the next will only occasion a few degrees lower temperature in the beds. But the case is different as regards the air of the house itself; for, under the above conditions, it would certainly be affected to a much greater extent,—perhaps as much as 20°. Presuming that the temperature of the beds is just what it ought to be, any attempt to counteract the coldness of the air in the pit on a cold night would cause an excess of bottom-heat, which, by repetition, must prove highly injurious to the plants. If the communication of heat from the tanks to the surface is only through the soil, the conduction of heat will be very slow, whilst its escape through the glass is rapid." The remedy for this, the writer goes on to say, is a separate command of heat for heating the house, which he proposes to supply by a 2-inch steam-pipe, running from the top of the boiler and ranging along the front of the house, immediately under the glass, terminating at the further end of the return-tank. Why steam, he does not say: perhaps a water-pipe would be sufficient for the purpose; but such is certainly an objection to which the system is open; and this is met in the range of houses proposed by Mr. Messenger, by hot-air chambers under the tanks, the air being carried up into the body of the house in the direction of the arrows ascending towards the ridge.

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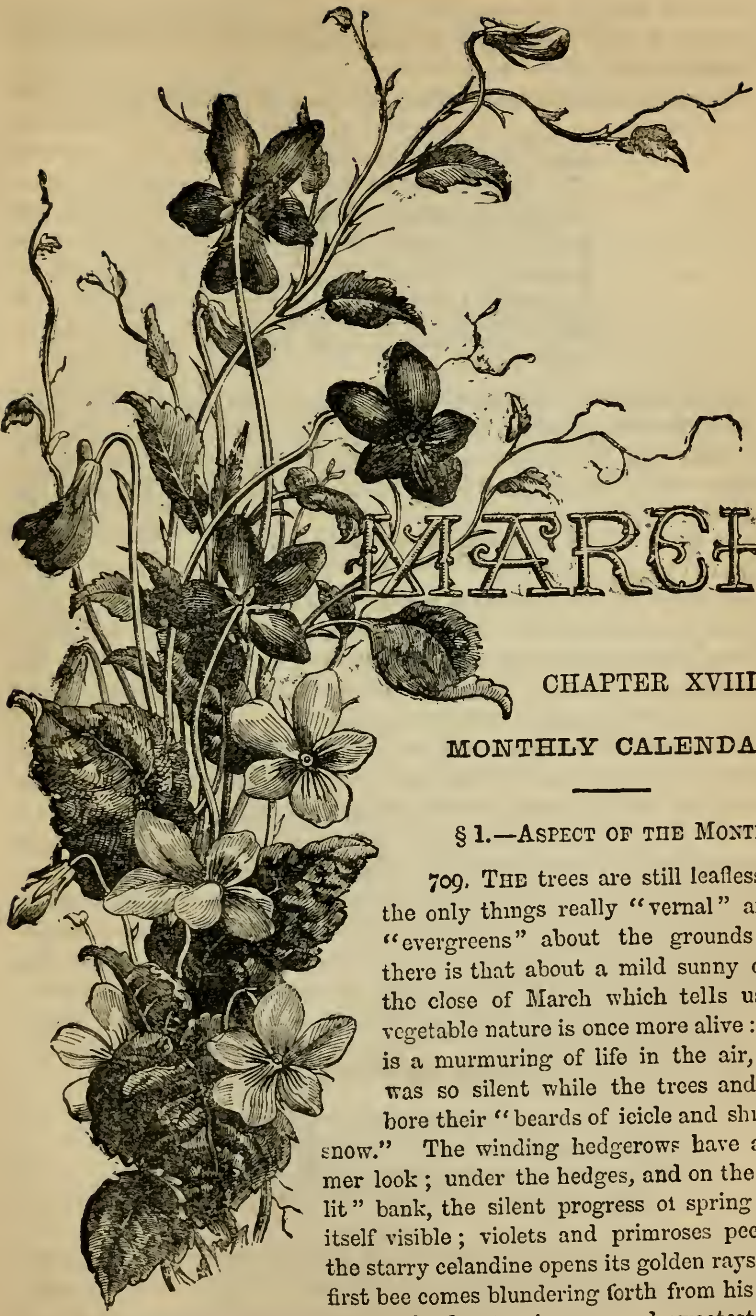

MARCH

CHAPTER XVIII.

MONTHLY CALENDAR.

§ 1.—ASPECT OF THE MONTH.

709. THE trees are still leafless, and the only things really "vernal" are the "evergreens" about the grounds; but there is that about a mild sunny day at the close of March which tells us that vegetable nature is once more alive: there is a murmuring of life in the air, which was so silent while the trees and fields bore their "beards of icicle and shroud of snow." The winding hedgerows have a summer look; under the hedges, and on the "sunlit" bank, the silent progress of spring makes itself visible; violets and primroses peep out, the starry celandine opens its golden rays. The first bee comes blundering forth from his winter den: well it knows, however, where the finest primroses and sweetest violets

blow, and soon finds the broadest yellow blossom of the furze-bush, in which it can bury itself while it rifles it of its richest pollen.

710. Though still leafless, many trees and shrubs are just bursting into leaf. In the words of good Bishop Mant, the poet of the months, on—

"Currant and prickly gooseberry,
Along the hawthorn's level line,
On bush of fragrant eglantine,
On bramble, and pithy elder pale,
On larch and woodbine's twisted trail,
And willow lithe, there's flush of green;
The forward sycamores display
Their foliage; and the shining spray
Of chestnut, to the sun protrude
His lengthen'd and expanding bud,
Which once unwrapp'd, in vain would Art
Fold it anew."

In the garden many floral ornaments begin to appear: the spring Adonis peeps out in the herbaceous border; the Fritillaria, or crown imperial, exhibits its drooping bells; the periwinkles open their bright blue eyes in old gardens, reminding us that Chaucer sang of its beauties along with the violet in his parterre:—

"There sprang the violete al newe,
And fresh pewinké, rich of hewe."

The delicate blossom of the almond perfumes the air with its fragrance, precursor of the apple, pear, and cherry; and others, which we need not name, admonish us "that the winter is past, that the rain is over and gone, and the flowers appear on the earth; that the time of the singing of birds is come, when the voice of the turtle is heard in our land."

711. March, while treading thus on the flowery borders of spring, does not fail to remind us that it was not without sound analogy that the name of the roughest of the fabled Olympian deities was given to it by the Romans. The stormy winds of the vernal equinox render it both boisterous and cold. These gales are distinguished from those of autumn, by their greater dryness, during which evaporation takes place with great rapidity. The moisture engendered by the heavy snows and rains of winter, exhales; "the dry winds of March come strong and thirsty, and drink up the dregs which winter has left in the cup;" and the earth is thus prepared for the seed about to be committed to its bosom. Hence the old rural proverb, which declares "a measure of March dust to be worth a king's ransom." Another homely adage is old enough among us to be embodied in verse by one of our poets:—

"March, though his early mood
Is boisterous and wild,—feeling that shame
Would follow his fell steps, if spring's young brood
Of buds and blossoms wither'd where he trod,—
Calms his fierce ire, while the blue violets
Wake to new life."

The increased temperature during this month is chiefly observable during the day: it is still very variable, advancing, as it were, by starts; but the mean temperature of the month is about six degrees higher than February, although the thermometer still ranges from 28° to 53°, including the night and day temperature, the mean maximum being 49° 9″, and the mean minimum 40° 49′.

> "Bold March! Winter sees thee, and calls to his train
> The sleet and the snow, and the wind and the rain;
> And they shrink away, and they flee in fear,
> When thy bold and merry steps draw near."

712. In looking over our notes for this busy month, we light upon a few hints for the garden, by a well-known florist, which will not be out of place here, although they are embodied in other language elsewhere. They refer to all-important subjects.

713. I. *Drainage.*—However high and apparently dry a situation may appear to ordinary observers, it is quite possible that it requires to be drained. The object of draining is not only to get rid of superfluous moisture, but also to prevent the little there may be from remaining stagnant. It is quite a common occurrence to find a piece of ground that is never too wet, but which is, nevertheless, sour and unfitted for the cultivation of delicate flowers. It should, therefore, be the first care of the florist to make drains from the highest part of the ground to the lowest, three feet from the surface, dug the shape of a V; and if there be no outlet at the lowest part, to dig a hole, or well, or pond, into which all these should lead, even when there is no apparent means of getting rid of the water. At the bottom of these drains a row of common earthen pipes of 2-inch bore may be placed, end to end, and be covered up again with the soil. They are too deep to cause any danger of disturbance in ordinary operations; but the effect is to let air into the soil, if there be no surplus moisture; and to prevent the lodgment of water anywhere: about a rod apart, in parallel lines, will be sufficiently close for the drains, and a larger drain along the bottom, or a ditch, may lead at once to the outlet or the receptacle for the water. Suppose, however, the place is really surcharged with water, and there is no place but the pond made for the purpose into which this water can pass, and suppose, while we are imagining evils, that this hole fills higher than the bottoms of the drains, it is obvious, in such cases, that the drains cannot empty themselves. Be not discomforted: if they can only discharge all the water in the driest season, immense good is done by the drainage, although these are the most unfavourable circumstances under which the garden can be placed; and if the pond be not too large, the garden-engine may be set to work to lower the water by throwing it over the surface; and although it may fill as fast as it is taken away, there is a circulation of the water in the soil, instead of the moisture being stagnant, and the ground made sour. If pipes cannot be had, use large stones, or even bushes; but, troublesome as the operation may appear, it will amply repay a man for the trouble in the comparative or complete success of his culture.

714. II. *Soil and Composts.*—The best soil in which to cultivate all kinds of florists' flowers is a friable loam; and if there be as much as two spadesful in depth, his work will be half done for him; because, instead of having to make

up the soil for his beds, he will only require the proper supply of dressing, for which he must provide himself with—

1. All the leaves which can be got together, except those in the shrubberies, which should be dug in.
2. A heap of clean road-grit.
3. A heap of sand, silver or river.
4. A good stack of turfs cut from some pasture, three inches or less in thickness.
5. A heap of cow-dung.
6. A heap of stable-dung, which is most suitable for the present purpose when taken from an old hotbed.
7. A stack of turfy peat from a common.
8. All the waste of the garden should also be placed where it may rot, for it is a capital dressing; because, when once fairly rotted into mould, it is next in value to pure leaf-mould.

715. We hear and read of all manner of exciting composts, such as guano, night-soil, bullock's blood, offal of the slaughterhouse, sugar-bakers' scum, and various other not very nice material; but all this resolves itself into the single fact that all animal matter, as well as animal dung, enriches the ground, —bone-dust, shavings of horn and hoofs, among the rest. But there is an uncertainty about the strength of all these materials which renders them unsuited for delicate and valuable plants, although, for farming operations and coarse vegetable growing, they are valuable. A collection of florists' flowers cannot be played with, and their existence would be often placed in jeopardy by exciting composts, of which the strength is not easily ascertained; whereas all those materials which we have recommended are known. Beyond thes we may mention rabbit-, sheep-, and even poultry-dung, which may be obtained for the purpose of using as liquid manure after being thoroughly decomposed; such liquid manure being made by stirring a pound of rotted poultry-dung, or half a peck of rabbit-, sheep-, or cow-dung, in 18 gallons of water for two or three days, and, when settled, it is fit for use.

716. III. *Water.*—A good deal of our success depends on the water we use for irrigation. The springs about Norwood defeated a friend of ours for years in the attempt to grow plants and flowers for show: it appeared to be charged with iron, and nothing did well with him until he sent for all the water he used to a pond a mile or two away from him. Some pump-water, apparently clear, is too hard to do well for watering plants, but this may be got over by keeping it in shallow tanks a considerable time before using. It is, however, far the best plan to contrive that every drop of rain-water be saved for the use of the gardener. Every roof that offers the opportunity should supply its contribution to tubs or tanks so placed as to receive it, and nothing but rain or river-water should on any account be used if it can be avoided. Plants under glass should always be watered from tubs or tanks kept at the same temperature as the plants are growing in; therefore some vessel must always be kept in the house. Nothing does much greater mis-

chief to plants than chilling them with water of much lower temperature than the atmosphere they are in. On this account, even soft-water wells will not supply it so warm as it ought to be; and, if it must be used direct from the well, it is desirable the chill should be taken off by a little heated water. These various points are most important in forwarding the cultivation of those occupants of the garden called, because they have been improved by seedling varieties, "florists' flowers and plants."

717. Our valued correspondent, the Rev. H. P. D., sends us some most seasonable directions also, of which we avail ourselves.

718. *Mats for Frames.*—As a substitute for the Russian garden-mats, which are expensive, and often not warm enough for protection against frost, a very durable and efficient mat may be made of the long stout reeds which are used by thatchers and plasterers, and which, in the parts of the country in which they are grown, may be bought for about tenpence or one shilling a fathom of six bundles.

719. Cut the reeds into lengths of 4½ feet for the width of the mat; work them in bunches about 1½ inch thick, the bunches to be tied tight together with strong cord, in three places, each with a single tie: the mat will thus present a succession of rolls of reeds strongly tied together, forming a strong warm covering for frames and pits.

720. The mat can be made of any length that may be required, and if rolled up and stowed away in a dry place, will last for years.

721. *Protecting Bedding-plants.*—It is always desirable to get bedding-plants out as early as possible, and yet there is much danger both from wind and frost in so doing. I have found it an excellent plan to stick sprays of evergreens, Scotch and spruce firs, in different parts of the beds as a protection. By this means the force of the wind is broken, and the plants take hold of the ground sooner: the tender leaves also are saved, which otherwise not unfrequently turn brown, and fall off, retarding the growth of the plants.

§ 2.—OPERATIONS IN THE FLOWER-GARDEN AND SHRUBBERY.

722. This is generally a busy, but by no means a genial month. March dust is said to be worth a king's ransom; but the winds that upraise it are especially rough and biting, harsh and boisterous, and especially severe upon weak and tender plants; indeed, trees, plants, and shrubs that may have borne the rigours of winter with impunity, often succumb beneath the chilling blasts of March. Therefore, if any plant, not quite hardy, has not hitherto been protected, that protection should now be afforded. The precaution is more necessary in seasons where there has been little or no early winter, especially after the disastrous effects of such winters as 1860, which left impaired constitutions and sickly growths. When weakened by previous disease, mismanagement, or disaster, such trees as *Araucaria imbricata, Cedrus Deodara, Pin*

insignis, and *Sequoa sempervirens,* that were in many situations half-killed with the extraordinary severity of last winter, may require slight protection with mats and boughs this spring. Sickly hollies, succulent growths of sweet bay, and *Laurustinus,* might be saved by similar treatment.

723. Magnolias, delicate roses, and other scarcely hardy plants on walls, should receive some shelter from the stern bite of March frosts and winds. Care must be exercised not to keep them too close and warm, or the remedy will prove more disastrous than the evil. For walls, nothing answers better than a thin layer of straw, covered over with a mat, and kept dry, if possible. This not only keeps *out* the cold, but keeps *out* the heat. Protection against the exciting energy of the sun's rays during this month is almost of equal importance to warding off the effects of extreme cold. The later in the season tender plants can be kept in a *dormant* state, the better, and nothing secures this object more effectually than a thin covering of *dry* nonconducting material, such as straw. The utmost caution must be exercised in removing protection from plants. Uncover them *a shred at a time.* Nothing affects them more injuriously than sudden transition from semi-darkness to perfect light, or from kindly shelter to full exposure. Often such a shock to the vital energies induces either death or constitutional debility, puny growth, and lingering disease. The safe practice is a straw at a time : ours need not be so tedious ; but it must be in harmony with this principle.

724. *Rose-Garden.*—Finish planting all hardy roses at once, if bloom is expected this season. The excited state of the shoots from this mild winter must not make you impatient to finish pruning. The more excited they are, there is the greater necessity for delay, as the expenditure of the sap in the terminal buds will preserve the buds near the base of the shoots the longer in a dormant state ; and it is upon these buds we are dependent for next year's blossom. In pruning roses, every bit of old wood, loose bark, &c., should be carefully removed, as it is exactly amid such *débris* that the larvæ of caterpillars, aphides, &c., are deposited. Whenever trees have been much affected with these pests, they might be coated over with a similar mixture to that recommended for vines, at page 232. This would remove all moss, &c. from the stems and branches, and prove an effectual preventive and eradicative measure : it is less troublesome and unpleasant than hunting all the summer for fat green caterpillars, buried deep in fine rosebuds, or wrapped up in glossy leaves, and driving away the delicious perfume of the roses with the noxious fumes of tobacco-water, or other horrid-smelling compounds. When the green fly does make its appearance, a strong infusion of carbonate of ammonia (smelling-salts) is the only remedy that ought to be admitted among choice roses in bloom. This will not only destroy the aphis, but supply the plants with useful food, and heighten, by its volatile aroma, if that were possible, the perfume of the rose. In small gardens, a number of trees might quickly be cleaned with the aphis-brush. This implement is made in the shape of a pair of large sugar-tongs, only at the end for taking hold of the sugar a pair of soft brushes are introduced. The shoot, with its living freight, is firmly grasped

between them, the tongs are gently drawn along the shoot, and the whole cargo of pirates consigned to a well-merited ignominious death.

725. *Flower-Garden.*—Yes, it is a *flower-garden* now, and not a series of beds for the plants to sleep away the winter in. Almost daily, something fresh peeps out cautiously and stealthily, as if anxious to see and feel what is going on above-ground, without being itself visible. Every day of genial weather, however, imparts strength and inspires confidence, and a number of flowers, either in embryo or further advanced, greet us with their gladdening look of beauty. The Snowdrop, that has so cheerily nodded its "How d' ye do, right glad to see you," for the last month or six weeks, is now putting off its vestal robes and going into widowhood and desolation for ten long months; but the Crocuses are now in full glory, and a brilliant display they make; while Tulips, Narcissi, Crown Imperials, Cyclamens, Ixias, Scillas, and Hyacinths, hasten forward to uphold the matchless supremacy of bulbs as the most beautiful of all spring flowers. The double-blossom Furze, deciduous yellow Jasmines, scarlet Ribes, Almonds, Heaths, Daphnes, Snowy Mespilus, *Magnolia conspicua,* holly-leaved Berberry, Saxifrages, Orobus, Calycanthus, &c. &c., weave a floral garland of which any month, not excepting June even, might be proud. This increase of beauty points out our duty, and defines the routine work for the month. The more beauty in the garden, the better it must be kept; for slovenliness and dirt are never so intolerably hideous and unbearable as when seen in juxtaposition with their opposites. Therefore, grass lawns must be frequently swept and rolled; gravel walks turned, fresh-gravelled, raked, rolled, and swept; edgings cut, planted, or altered; and all planting, pruning, and digging, finished as soon as possible. This is also a good season to remove plantains and daisies from the turf, and to sow grass-seeds for new lawns. Fork over flower-beds on frosty mornings, to expose a fresh surface to the atmosphere, and provide a finely-pulverized soil for the roots of bedding-plants. Stir the surface by flat-hoeing, or deep-raking among borders of annuals and bulbs. Complete pruning and training Clematises, Jasmines, Bignonias, and other creepers on trellises. Remove all prunings and winter rubbish, to be either rotted or charred, and see that the entire garden has a cared-for appearance.

726. This is the proper month for planting all the hardy Gladioli. If they were taken up in November and kept in a proper temperature, they will now be *starting,* and should be planted at once. They grow well in any rich garden soil. I have grown *Bowiensis,* a fine, rich, light scarlet variety, which I believe was raised in Suffolk, and is not yet in the London trade, extensively for several years. Drills are drawn on beds or borders about four inches deep, the bulbs inserted, and covered over with the soil. Stakes about two feet high should be put in at the same time, as, if inserted afterwards, they might injure the bulbs. The distance between the bulbs should be from nine inches to a foot. Nothing can exceed their brilliancy when in flower. My employer calls them Her regiment of soldiers; and their regal habit and noble mien justify the title. The beautiful spear-shaped leaves, of a bright green hue,

give an exquisite setting to the flowers. I have many other varieties of the *Gandavensis* section, and they all thrive well under the same treatment.

727. In addition to the sowing of the annuals named last month, the following should be at once sown, either in the reserve-garden or on beds, or in rows where they are intended to flower:—

Adonis flox,—1 ft., crimson.
Calandrinia grandiflora,—1½ ft., bright purple.
 „ rosea,—¼ ft., rose.
Calliopsis atropura,—1½ ft., dark velvety brown.
 „ coronata, — 1 ft., marbled, crimson shaded.
 „ Burridgii,—1½ ft., rich crimson, golden orange-yellow border, and brown centre; one of the best of the Coreopsis-like flowers.
 „ coronata,—1½ ft., yellow-spotted; very handsome.
Campanula Lorei,—1 ft., beautiful blue bell.
 „ Lorei alba,—1½ ft., pure white.
Centauria depressa rosea, — 1 ft., rose, beautiful.
 „ depressa americana,—2 ft., blue.
 „ macrocephala, — 3 ft., golden-coloured corn-flower.
Chrysanthemum album flore pleno,—2 ft., white.
 „ golden,—2 ft., orange.
 „ Burridgianum,—a fine crimson ring surrounds the yellow circle next the eye; a beautiful variety.

728. *Clarkia.*—The whole of these are so beautiful, that all who can afford it should grow all the varieties. Those who cannot afford three or four shillings for this purpose may rely upon the following giving them entire satisfaction:—

Clarkia pulchella,—1 ft., pretty rose.
 „ pulchella alba,—1 ft., pure white.
 „ pulchella alba, fl. pl.—1 ft., double white.
 „ pulcherrima, — 1 ft., new, brilliant; the most showy.
 „ integripetola,—1 ft., rosy violet; a splendid variety of the pulchella, nearly double the size.
Collinsia bicolor,—1 ft., white and blue.
 „ bicolor albiflora, — 1 ft., pure white.
 „ Bartsiæfolia, — ½ ft., crimson, lilac, and white.
Convolvulus minor,—1 ft., blue and white.
 „ minor albus,—1 ft., pure white.
 „ minor albus, fl. pl.—This double variety is highly recommended as an edging, or for a small bed.
The different varieties of Convolvulus major are best sown in heat with the half-hardy annuals.
Erysimum Perofskianum,—1½ ft., orange. By cutting the flowers off as soon as they fade, and preventing it running to seed, this plant may be kept in flower throughout the entire summer.
Eutoca viscida alba,—1 ft., white.
Gypsophila elegans,—1 ft., white and pink.
 „ rosea, 1 ft., rose.
Larkspurs,—all the varieties. The chief colours are blue, rose, and white; and they are divided into hyacinth, rocket, and stock-flowering varieties. They vary in height from 2 ft. to 1 ft. Planted in rows, or in groups of distinct colours, their pyramidal racemes of bloom have a charming effect.
Linaria cymbalaria, — ½ ft., lilac; a neat close-growing plant, well adapted for dwarf edgings or rock-work.
Linum grandiflorum,—1 ft., blue flax-plant.
 „ grandiflorum rubeum, — ¾ ft., crimson; pretty, not equal to its high character as a bedding plant.
Love-lies-bleeding (Amaranthus caudatus),—2½ ft., red; beautiful in rows or masses; near to white or yellow.
Lupinus.—These are all beautiful, the height ranging from 1 to 3 ft., the colours including purple, lilac, white, violet, yellow, blue, red, and brown. The names of most of them are simply indicative of their colours. They should be sown in the reserve garden, and transplanted to where they are required to bloom.
Malope grandiflora,—3 ft., red mallow-looking flower, with bright glossy foliage.
 „ grandiflora alba,—white ditto, with beautiful purple.
Nigella hispanica atropurpurea,—1½ ft., dark violet.
Œnothera, or Godetia, alba flora,—1 ft., white.
 „ Lindleyana,—1 ft., white and red.
 „ rosa mexicana,—1 ft., rose and white.
 „ bistorta Veitchii, — 1 ft., dark yellow leaf.

Œnothera Drummondii nana,—1ft., golden.
Papaver, or Poppies, are now divided into Carnation, Ranunculus, and Peony-flowered varieties. They must be carefully sown, as the seeds are very small.
Prince's Feather,—3 ft., crimson.
,, procumbens,—very dwarf, yellow and crimson.
Saponaria calabrica,—½ ft., red, compact; beautiful for borders or small beds.
,, calabrica alba,—white.
Scabious, or Ladies' Pincushions, are both curious and beautiful, from 1 to 2 ft. high, and red, scarlet, or lilac colours, the pin-heads appearing as white specks on these grounds, the flowers being ranunculus-shaped.
Sunflower (Californian improved), 3 to 5 ft. in height, flowers 6 inches across; noble habit.
Sweet Peas,—various colours, in patches or rows.
Venus' Looking-glass (Campanula Speculum),—½ ft., blue and white.
,, Navelwort (Cynoglossum unifolium), — ¾ft., beautiful silvery-like flower for margins.
Virginian Stock (Malcomia maritima),—½ ft., red and white; beautiful for margins. By constantly picking off the seed and liberal waterings it may be kept in flower the whole summer.
Veronica syriaca (Syrian Speedwell),—pretty for margins. Sow where it is to flower.
Viscaria oculata,—¾ ft., pink, dark eye.
,, oculata nana coccinea, — ¾ ft., scarlet, dark eye.
,, Damietta, — 1 ft., white, dark eye.

These and others are beautiful for borders, small beds, and single lines.

729. *Half-hardy Annuals.*—If the frame has been prepared as recommended last month, lose no time in sowing the following half-hardy annuals. Other varieties may be deferred until next month, when a descriptive list will be given. Place a layer of four inches of leaf-mould on the top of the hotbed, then a layer of the same depth of fine sifted soil, consisting of equal parts loam, leaf-mould, peat, and sand. Sow the seeds in drills, formed about a quarter of an inch deep, with the point of a stick (for very small seeds, one-eighth of an inch will suffice). Carefully sow, label, and cover the seeds as you proceed. If the soil was in a proper medium state in reference to moisture, and it is shaded from the midday sun, no water will be necessary until the seeds appear. The frame must not be allowed to rise above 45° or 50°, and should never sink below 40°. The atmosphere should be changed daily by the admission of air, and the surface of the soil looked over frequently, to see if any *mould* or fungus is making its appearance on the surface of the soil. This must be at once removed, and the spots where it appeared dusted over with quick lime. With proper treatment, most of the plants will appear in from a week to a fortnight of the time of sowing.

Ageratum cœlestinum nanum,—1 ft., blue.
,, mexicanum albiflorum nanum,—1 ft., white.
Clintonia pulchella,—and other varieties, but generally they are too delicate for out-of-door culture, except in the most sheltered situations.
Anagallis, of sorts; Cannas, or Indian Shot; Daturas, Dianthus, Elychrysums, and Ipomœas, should also be sown; also Lobelia speciosa, the best of them all; Phlox Drummondii, Ruella nankinensis, Ricinus, Schizanthus, Stocks, and Zinnias.
Isotoma axillaris,—1 ft., blue.
,, longiflora,—1 ft., large, flowers few.
,, petræa alba,—1 ft., white starry flowers.

730. These are extensively used for grouping purposes, and where this is intended, they should be pushed on and potted singly into small 60-sized pots, previous to planting. They are very neat continuous-flowering plants, and if cut back several times during the summer, form nice compact masses of bloom.

731. All other annual seeds may remain until the next month, and biennials and perennials may also be left till then.

732. Proceed with the potting-off of all bedding-plants; keep them close for a fortnight after potting. No place is so good for them as a frame, with a hot-water pipe run round it to exclude frost: in the absence of this, the frame must be kept quite close for a few days, partially shading it at noon rather than giving air. Where there is not room in the pits, they are often placed in vineries, or other structures, at work. This is unavoidable, generally, but never desirable: the plants are always sure to become *drawn,* and it requires great judgment to harden them off fit for the garden, without checking them severely. In cold-pits they will still require protection on frosty nights. Use light rich soil for potting. A single crock, or a hard bit of manure, over the hole, will be sufficient drainage for bedding-plants at this season. The whole of the pot will then be filled with food for the roots. Keep the propagating-house at a temperature of from 60° to 70°, and try and finish increasing your stock during the month. Pot as soon as rooted, and urge the cuttings on to a vigorous growth, in a genial temperature of from 50° to 55°.

733. This is also the best month for increasing dahlias by cuttings. If the old stools were placed in a warm pit or house, as recommended last month, cuttings three or four inches long may now be secured. Cut them off close to the stem, if you can find as many as you want by this mode; if not, leave one or two eyes on the old stool, and in another week these eyes will furnish two, four, or six more cuttings. Place them in light sandy soil; plunge the pots in a bottom-heat of 80° and a top-heat of 60°: in a week or ten days they will be rooted. The white, scarlet, yellow, and purple bedding sorts should also be placed into heat, where an increase of stock is required. I find the dwarf whites much more difficult to increase than the other colours: nothing can look richer than rows of these dwarf dahlias in ribbon-borders, or groups of them in front of shrubberies.

734. *Shrubberies.*—Let all planting and alterations cease for this season at once. Top-dress rhododendron-beds with equal parts of cow-dung (thoroughly decayed—say four years old) and leaf-mould. On poor soils this imparts a rich gloss to the foliage, and causes luxuriant healthy growth. Where such material is not procurable, a thick layer of leaves may be *pointed* in with excellent results. Finish digging and clearing all this department, and manage to have a clean home for the shrubs, before they robe themselves in their beautiful flowers. Attend to staking, tying, and mulching all newly or recently-planted trees and shrubs, before the March winds tear them half up by the roots. Choice specimens, recently moved, would be much benefitted by a copious syringing with the engine, on the evenings of dry pinching days to check perspiration, and husband the scanty juices of the plants. The usual routine of sweeping and rolling turf and gravel must be assiduously attended to: if the weather is mild, the grass must have a first mowing during the month.

735. *Reserve Garden.*—Stir the soil among winter-sown annuals; transplant

them to their blooming quarters in the flower-garden. Sow ten-week stocks on a sunny bed for succession to those raised in heat. Prepare a piece of ground for sowing Anemone seed,—Hortensis, Coronaria, and Rectifolia, are the most useful varieties for shrubberies. Rub the seed clean in sand; sow in shallow drills nine inches apart, and cover with fine sifted leaf-mould and sand. Get ground in readiness for a general sowing of all biennials and perennials next month. The oftener it is forked over, the more thoroughly pulverized it will be; consequently, the better adapted for raising seeds of every description. Protect seeds from birds, which are often most destructive just as the seeds are vegetating. Enrich the hooped beds designed for the temporary protection of bedding-plants, next month, with a liberal dressing of manure, and get everything in readiness that the approaching busy season will demand.

736. *Florists' Flowers—Auriculas.*—As the power of the sun increases, if the weather continues mild, these plants might now have the benefit of warm showers. The lights should be drawn off daily on fine days. When the weather is rough and boisterous, avoid cutting draughts. See that the plants have plenty of water, as they will now be throwing up their flower-stems. The plunging material may be sprinkled, to keep up a moist genial atmosphere. Plants intended for showing should have seven pips as level as possible, round, and well shaped: any ill-shaped small pips may be cut off to avoid crowding. Cover up securely from frost, and shade for a few hours on bright days: take off offsets, and insert in a close frame; water with care until rooted.

737. Carnations and picotees should now, if the weather is mild, be placed in their blooming-pots, and sheltered under glass during bad weather: they should be potted firmly, care being taken to keep the soil out of the axils of the leaves. Pinks in pots or open borders should be top-dressed with a mixture of fine loamy soil and half-rotten manure.

§ 3.—The Mixed Kitchen-Garden.

738. There are thousands of good old English gardens where it would not only be contrary to the genius of the place, but practically impossible, to separate altogether the kitchen and flower-garden. Most gardens attached to farm-steads, and many vicarage gardens, fall under this category. But there are many others of greater pretensions, where it would be a great mistake to leave what is called the kitchen-garden entirely devoid of floral ornaments. Without at all interfering with the proper and profitable culture of vegetables and fruits, the kitchen-garden, with a little taste and far less labour, may be made extremely ornamental. Let the walks that need it be kept well gravelled; and, as box-edging is always getting out of order in a kitchen-garden, substitute for this a thin tile, one foot long and one inch thick, and about six inches deep, scalloped at the top, which may be purchased at the shops in various patterns; or a row of fine bricks, laid at an angle, as in the engraving, make a good edging. These, which are very inexpensive, and last a long while,

should be inserted half their depth in the soil, and form a very useful and ornamental division between the walk and the border: a small movable wooden step should be used whenever it is necessary for the barrow to pass over them. A broad grass-walk, also, down the centre, or elsewhere in the kitchen-garden, may be made to contribute much to the beauty of it, by having rows of well-trained pyramidal pear-trees planted on each side, with standard rose-trees in the intervals between the pears, and in a line about two feet nearer than they are to the centre of the walk; wire arches, with roses over them, may in different places be thrown across the gravel walks without at all interfering with the general purpose of the garden, and with a very pleasing effect. Crocuses, narcissi, and daffodils near the edging-tiles will make the walks gay in the spring. The piers of the walls also, without at all interfering with the fruit-trees, may have many pretty flowering-shrubs, &c. trained up them.

739. *North Borders.*—A north border under a south wall in a garden is generally much undervalued. In the flower-garden, a north wall, if it happens to exist, is frequently looked upon as a nuisance, and covered with ivy; in the kitchen-garden it is only more profitably occupied by Morello cherries and red-currants, while, in both cases, the border is kept as shallow as possible, and turned to little or no account. Many plants and shrubs, however, will flourish upon a north border and against a north wall, and show themselves hardy there, which in any other situation would not outlive a winter's frost. In the flower-garden let the north wall have a good deep border of bog, and against the wall all the hardy sorts of camellias will flourish and blossom freely. The green and black tea-plant also, not having their bark exposed to the scorching sun of summer, will survive our severest winters in such a situation. Rhododendrons will also do well, and so will chrysanthemums. All our hardy indigenous ferns do better upon a north border than under any other aspect. Those persons who wish to acclimatize any tender plants should, by all means, make their first experiments upon a north border or against a south wall. The shady side of a south wall is decidedly the best position for all cuttings during spring and summer, to enable them to stand the severity of winter.

740. *Basins and Tanks.*—Both in flower and kitchen-gardens tanks are not only useful, but may be made exceedingly ornamental. The position should be in the centre of the broad grass-walk. A simple tank of this kind may be made by digging out the soil in a circle four feet deep, and puddling it all round with tempered clay, that is, clay thoroughly washed and kneaded, until divested of all silicious soil, and nothing but pure clay remains: this well rammed round the whole excavation for nine or 10 inches, is impervious to water. Large stones, or boulders of handsome shape, placed with apparent irregularity, but real symmetry, all round, will form a handsome and useful basin; and if some of the more delicate water-plants, as *Arums* and other *Nympheæ*, are planted in the bottom, as directed at paragraph 224, a good effect will be produced.

741. *Trellis-work* may frequently be introduced with good effect in the

mixed flower and kitchen-gardens, to shut out buildings or unsightly objects. Small oak stands, or larch poles, about five or six feet apart, and having the intervals filled with thin iron wires crossing each other, form the most durable trellis-work. Against the walls of a house a very nice trellis-work may be made with a lacing of copper wire over nails of the same, which may be worked in any pattern, and carried in any direction. To this wire the creepers may be tied when necessary; in this way house-walls may be covered with flowers or evergreens, without injury to themselves from continual nailing.

742. *Tile-beds for Grass-plots* form very pretty and very ornamental objects made on grass borders, or on lawns of kitchen or mixed gardens. The tiles, or pipes, as they are called in some parts of the country, should be of bright red clay, 12 inches long and about three inches in diameter, and all carefully formed in the same mould. These should be placed upright in a circle, or any other figure, buried, according to taste, about four to six inches in the ground; the earth and the beds being raised to the level of the outstanding part of the tiles. A very effective centre bed can be made with these tiles in three tiers, the edges of each tier being built in scallops, and a border left about 1½ or two feet in diameter. These three borders have a beautiful effect when filled with different plants. Take, for instance, *Calceolaria aurea floribunda* for the top department; Tom Thumb's, or Frogmore's, for the middle border; and Mangles's variegated geranium for the lower. These beds would have an agreeable appearance even in winter when cleared, on account of the contrast between the bright red tiles and the grass; and in spring may be made very gay with hyacinths, crocuses, and other bulbs.

743. *Basket-beds of Ivy* on grass-plots form a pretty variety, and may be made round or oval, according to fancy. A frame of wicker-work should be made, the shape of the bed, about one foot or 1½ foot high, around which, on the outside, should be planted, quite thick, either the large Russian, or the small-leaved and variegated ivy. In a year or two, with a little care and attention, the wicker-work will be quite covered, when the ivy must be kept well cut in, and the earth in the basket may be raised or not at pleasure. With a little trouble, the ivy may be made to trail over wands, and form a handle to the basket.

744. *Oak and Holly-beds.*—Acorns sown very thick round a bed in a drill about two or three inches wide, in the course of a year or two form a very pretty edging; and owing to the thickness with which they stand, with an occasional clipping, the small oaks may be kept four or five inches high, and in this manner have a very good effect. Hollies also may be used in the same way; but in this case it is better to raise the plants on a seed-bed, and transplant them to the bed for which they are required as an edging, when about two or three inches high. They may be kept dwarf by cutting, and will not become too large for their position for some years.

745. *Leaf-shaped Beds.*—Some of the prettiest beds for lawns may be made by cutting them out into the natural form of the leaves of trees, shrubs, and plants. The form of the common ivy-leaf makes a very pretty bed, so does

the heart-shaped ivy; also the oak, the maple-leaf, the horse-shoe geranium, and an endless variety of others. Beds so formed have this advantage, that they can be called by the name of the different trees, shrubs, and plants from which they have been taken.

746. *Cross-shaped Beds.*—The various sorts of crosses also form very ornamental beds, and have this advantage over fanciful figures, that they may easily be designated by their particular names. Nothing is more brilliant than a Maltese-cross bed, filled in each separate compartment with different shades of verbenas, or in the opposite compartments with the small dark blue lobelia and *Gazania splendens.* The St. Andrew's-cross also forms a nice bed, and so do the different forms of upright crosses, when the stem and the transverse are filled with flowers of such shades and colour as contrast well with each other.—H. P. D.

747. *Sweet Herbs.*—The *olitory,* or herb-garden, is a part of horticulture somewhat neglected, and yet the culture and curing of simples was formerly a part of a lady's education. There was not a Lady Bountiful in the kingdom but made her dill-tea and diet-drink from herbs grown under her own eye; and there is a neatness about our thyme, sage, spear-mint, and marjoram, that might again justify their transfer to the patronage of white muslin, or, as these are days of sisterhoods, "grey weeds." They are all pretty, and a strip of ground halfway between the kitchen and the flower-garden would keep them more immediately under the eye of the mistress. This would probably recover, for our soups and salads, some of the neglected tarragons, French sorrel, purslain, chervil, dill, and clary, which are only found now in the pages of the old herbals. Laid out after a simple geometric design, the herb-garden might be rather ornamental than otherwise. Most of the herbs are propagated by slips in the autumn. *Basil, burnet,* and other herbs, require to be sown at this season, on slight hotbeds of about two feet in depth; but many cultivators leave them till next month, and sow in the open ground, unless they are wanted early. Thyme, marjoram, savory and hyssop, chervil, and coriander, may be sown this month in dry mild weather, to be transplanted by-and-by, in such a strip as we have indicated for them. Sow in shallow drills about half an inch deep and eight or nine inches apart, and cover in evenly with the soil. *Mint* may also be propagated this month, by separating the roots, and planting them in drills drawn with a hoe six inches asunder, covering them with an inch of earth, and raking smooth. They will quickly take root, and grow freely for use in the summer. This method may be applied to the several sorts of spearmint, peppermint, and orange-mint.

748. The whole family of borage, burnet, clary, marigolds, orach-root, carduus, dill, fennel, buglos, sorrel, and angelica, may be sown about the middle of the month, when the weather is open. Sow them moderately thin in drills or beds (each sort separate), in good light soil; if in drills, six inches apart; some of the plants to remain where planted, after a thinning for early use; others to be planted out in the summer.

749. *Parsley.*—Full crops of parsley should now be sown in drills along the

edges of one of the borders; but in order to grow this useful herb in perfection, it is necessary that the roots and stem should be kept in a perfectly dry state: this is indispensable to the health and freshness of the plant. In preparing the beds, therefore, remove the soil to the depth of six or eight inches, and fill in the bottom with the same depth of stones, brick rubbish, and similar loose material. Over this prepare the bed of light rich soil, which will thus be raised considerably above the level of the ground, the bed being raked smooth and level. Towards the end of May, sow some seed of the most curly variety, either in shallow drills, slightly covered with fine soil, or thin broadcast raked in. If the weather continue dry, water frequently: in five or six weeks the plants will have appeared; when large enough, thin them out, so that they may be four or five inches apart. By the end of autumn they will be large and vigorous plants. At this time, drive a row of stakes or hoops into the ground, on each side of the bed, so as to form arches strong enough to support a covering of mats, which should be laid over them as soon as frosty or wet weather threatens to set in. During intense frosts, increase the protection, removing it on fine days, and removing it entirely in mild weather. The soil should be kept dry, and all decayed leaves carefully removed: in this manner this useful vegetable may be available all the winter.

§ 4.—Operations in the Kitchen-Garden.

750. During this month the great operations of the year are commenced, and most of the principal crops got in. Hitherto, warm and sheltered spots and borders have been appropriated, but the larger quarters have been dug up into ridges, and as large a surface as possible exposed to atmospheric influences. Now the whole garden is to be cropped upon a carefully-considered plan, so that no crop of the same character should follow on the same spot; for instance, where any of the Brassicæ, or deteriorators, were grown the previous season, follow them with preparers, which are mostly root-crops, as potatoes, carrots, parsnips, onions, scorzoneras, salsafy, &c. These, again, should be followed as far as possible by surface-crops, which are mostly the shortest-lived of any, and include all saladings. We may go further, and include pot or sweet herbs, and also medicinal herbs, besides some of the shorter-lived vegetables, as spinach, coleworts, French beans, early carrots, and the longer-lived sorrels, and even strawberries; so that surface-crops comprise a group equally copious with exhausters or preparers. Map out the garden, therefore, and give each crop its proper position and space, and note the time of its duration as a guide for selecting its successor: this applies to kitchen-gardens of any extent, but more particularly to those which are limited, because it economizes the room. Those crops called deepeners, on account of the depth and richness of soil they require, and their long occupation of the same spot, comprise but a small portion, comparatively, of the occupants of the kitchen-garden, and cannot be used in the same proportion, although their office in respect of deepening the soil is important; but where

bush-fruits are grown largely in the kitchen-garden, they may be added to the group, and managed in the same way; that is, plant a certain number every year and remove an equal number of old ones: by this a fresh piece of soil can be devoted to grosser-feeding crops, which has long been innocent of them. The principal point of culture for the *Deepeners* is that the ground must be deeply worked, both at planting and taking up. For the *Preparers* the ground should be trenched two spades deep, chiefly bastard-trenching, with plenty of manure of good sound quality, or mixed with maiden earth. For the *Surface-crops* merely pointing or forking manure into the surface, or top six inches of soil, will suffice; after which, if again trenched two spits deep, adding no fresh manure, the ground will be in excellent condition for the most scourging of all crops, the *Exhausters;* namely, broccoli, savoys, Brussels sprouts, cabbages, borecole, &c. By working on some such principle as this, the soil may be kept in a state of fertility for ages without fear of those vexatious and disagreeable results which arise from want of method and forethought.

751. It should be observed, that to carry out this system of grouping and rotation there must be no edging of beds with parsley, chives, or other dwarf plants, for appearances; no devoting particular corners perpetually to sweet herbs for convenience; no edging the quarters with strawberries, or "what-not;" but every plant must take its place and turn as part and parcel of the whole; every variety and species must perform its part in preparing the ground for a successor: it may appear difficult, but it is practicable.

752. Having laid down a well-devised plan for the season, the operations become comparatively easy; assuming, therefore, that previous directions have been attended to, that the soil was turned over in autumn, that it has been frozen, the surface turned over and frozen again, and dried by the winds which generally occur early this month, it is now ready for cropping.

753. *Seakale* still requires some covering, but less than last month, blanching being now the main object of it; and sand, ashes, or leaves, will effect the object. When the kale is past blanching, its use does not end here: the leaves may be eaten all through the summer and autumn while they are green, merely dressing them in the same way as winter greens. Thus it will be found a very profitable crop for cottagers: it grows well in shady places, and is not particular as to soil, and will stand a cold, bleak climate. A top-dressing of very rotten dung, of any kind, is suitable for this plant, but it is rendered more efficacious by the addition of a little salt,—about a pound to the barrowful of manure: wood-ashes are also beneficial, and may be added in any quantity.

754. *Celery.*—It is too early yet to sow the main crop of celery, but a little may be sown for early use. First sowings may be sown in seed-pans; but for the main crop I prefer shaking together a small heap of stable-dung, just sufficient to give a slight heat: spread three inches of soil on it, sow the seed, and cover with a hand-glass. They come up much stronger I find by this method. This seed takes a long while to germinate compared to some: that sown in this month will be ready to transplant in April.

755. *Jerusalem Artichokes* should be planted not later than this month. The ground for them should be rather deeply worked, which gives them a firmer hold; for, the plant growing tall, is exposed to rough winds, which they resist better where they root pretty deeply. Almost any part of a tuber will grow and form a plant; but it is advisable to select middling-sized tubers, planting them a foot or 10 inches deep. This may be done as the ground is dug or trenched; or they may be planted with a spade or trowel, making a hole for each set. They should be not less than a yard apart: four feet is better. The more open the spot, the more likely they are to prosper. As a rule, they produce a great number from each set. No other treatment is required than to keep the ground well stirred about them, and prevent the growth of weeds. Cut them down when the leaves are decayed, but not before; otherwise the tubers will cease to grow.

756. *Globe Artichokes* will be making offsets about the end of this month, or during next: these should be taken off for propagation. They bear best the second or third year after planting; so that it is advisable to plant one or more rows every year, and remove the same quantity of old roots. The ground should be deeply worked and well manured: let the manure be incorporated with the soil, not laid in a mass at the bottom of each trench. It is better to trench the ground first, and fork the manure well into the surface-spit, which gives the plants a better chance of immediately profiting by it. The offsets may be dissevered with a knife, or slipped off and cut smooth afterwards, and planted with a dibber. Some plant in threes, a yard apart, and four feet from row to row; or they may be planted singly, two feet apart in the row, and four feet from row to row. They should be well watered, and the ground kept loose between.

757. *Cardoons* are not so generally cultivated now as formerly, especially in small gardens, on account of the space they require. The seed is sown in March, in a warm sheltered spot, or under a hand-glass or frame. When large enough, they are planted 8 or 10 inches apart, in rich or well-manured soil. Then again they are planted in rows or trenches, after the manner of celery, only at a much greater distance from each other. During the autumn, earth up to blanch. The plant grows very large, after the manner of the globe artichoke. Much room is required for banking-up; accordingly, some gardeners recommend placing them five feet apart at the final planting; but the crop can never pay for this enormous extent of ground.

758. *Potatoes.*—About the beginning of this month is the time to get in early potatoes. Some recommend planting them in October, placing them deep enough to be out of the reach of frost. In porous well-drained soils this answers admirably; but the advantage is not so great as to recommend it for general practice. To insure a good crop, the ground should be bastard-trenched in October or November, and left in ridges; in February levelled, and some thoroughly decomposed manure forked in. In March the frosts will have left it well pulverized, and ready to receive the sets. Some prefer middling-sized potatoes for setting, planting them whole, scooping out all the shoots except

one or two; others prefer large ones, cut in two or more, assuming that a large potato makes stronger shoots, capable of standing erect in full light of day.

759. *Carrots* may be sown early this month, but the main crop should be deferred till the first week in April. Such sorts as the intermediate may be sown in the four succeeding months: they will be useful to those who like to have this vegetable fresh and sweet from the ground. The ground should be deeply dug or bastard-trenched in autumn, left at first in a rough state; but when it has been well frosted, stir and level it in January or February. For the purpose of doing this, the Canterbury hoe (that is a hoe having three prongs instead of a blade) is a very useful implement. This treatment of the soil applies in all cases of spring-sowing, especially if the ground is heavy or retentive: in that case it will not fall to pieces, unless it has been frosted and dried by winds. In preparing the ground for carrots, no manure should be applied: it is known that it induces them to fork, and they are more likely to become grub-eaten. A dressing of sand is advantageous.

760. *Cabbages.*—It is advisable to sow some cabbage-seed of a quick-hearting sort, to follow those raised in January, or that have stood the winter. They will be of great service in July and the following months. The Early York, Large York, Nonpareil, Matchless, or indeed any sort, will do for the purpose. Sow broadcast on a warm sheltered spot, and protect from birds with light litter or netting; but, if covered with litter, it must be uncovered to admit light and air, or the plants will be drawn up weak. Avoid planting cabbages when the ground is soddened after heavy rains. The soil is best when tolerably dry, and the state of the weather most favourable is a dull day preceding rain. It is an excellent plan at all times to mulch the roots of the young plants in a compost of soil and soot, wetted to the consistency of thick paste. This saves a great deal of trouble in watering afterwards, and in the driest weather will generally prevent flagging. Broccoli-plants so treated will be found very free from clubbing. All young plants should be set deep, certainly to within an inch of the first leaf.

761. *Cauliflower-seed* sown now will furnish plants for planting out in May and June: it may be sown in the open ground, or in a frame or hand-glass. Sow on the surface, tread and rake, and protect with litter or netting.

762. *Broccoli,* such sorts as Walcheren, Purple Cape, or any sort that heads in autumn, should be sown at this time in the same manner as cabbage or cauliflower. They will be ready to plant out for good in May or June, and will be very useful at a time when summer crops are over, and winter crops not ready.

763. *French Beans* may be sown towards the end of this month, choosing an early dwarf sort; but the principal sowing should be deferred till next month: those sown this month should be in a border, sheltered from cold winds, but open to the full sun. This crop is less hardy than most others, being often cut off by late spring frosts, of which it is very susceptible; for that reason, it is advisable to sow rather sparingly this month, and also to sow rather thickly. Draw some drills two feet apart and two inches deep; drop

the seeds one inch from seed to seed, and draw the earth in a ridge two inches high, which will cover the seeds four inches; when up, thin to three or four inches. But it often happens that early sowings do not all come up, or come thick in parts, leaving others bare; so that, to regulate the crop, it is necessary to thin out where they are thick and plant the thinnings to fill up the vacancies. This should be done in mild weather, or in the morning, so that in watering, to settle them in the ground, they may get warm before night.

764. *Radishes* may be sown thinly between the rows of the more enduring crops, such as onions.

765. *Peas* should be sown more this month, as formerly directed, and coal-ashes scattered at the roots of those coming up, to prevent their destruction by slugs, sowing a row of many-leaved spinach between the rows.

§ 5.—FRUIT-GARDEN.

766. If there are any fruit-growers who still doubt the efficacy of protecting the blossoms of apricots, peaches, and other wall-fruit, this month will test their faith. To those who will be guided by reason, we say, Apply the most efficient protection within your reach. This will probably be found in temporary wood copings, projecting ten or twelve inches from the wall, with canvas curtains attached, which can be readily removed in fine weather; next to the coping, worsted netting is, perhaps, the most efficient defence against severe weather, with the least obstruction to the necessary circulation of air, light, and rain. Those who have curtains will do well to use them, not only against frost, but against the extreme ardour of the noon-day sun, which will at once retard and strengthen their blossom. Generally speaking, the pruning and nailing will be finished, but the trees should be washed with the garden-engine or syringe, using tepid water, with solution of sulphur and soot, or lime-wash, as a protection against scale and other insects. The apricot, the fruit of which is held in such high estimation, has a tendency to die prematurely,—first a branch, then a side, until scarce a vestige remains of the tree; and this generally occurs on fine sunny days in spring and early summer—supposed to arise from the sap-vessels being excited too early and rising too rapidly; so that they are in too watery a state to resist the severe frosts which sometimes follow. Every possible protection should be given to these delicate trees, and, perhaps, planting them in a border, where they would be less exposed to the action of the sun, would help to retard the rising of the sap till the season was more advanced. Trained trees not already disposed of should now be pruned and dressed at once: to delay till the buds swell is to endanger them in the process.

767. In pruning all kinds of fruit-trees, there are a few general rules which must not be lost sight of:—

1. To arrange the branches, so that every part of the tree is exposed to light and air, and the tree fairly balanced.

2. To allow no branches to remain which are unfitted for their functions.
3. To bear in mind that fruitfulness and luxuriant growth are opposite qualities.
4. That extreme fruitfulness is as injurious to the trees as exuberant foliage, and true art consists in regulating both.

768. With a thorough comprehension of these principles, the saw, the axe, and the bill-hook may be dismissed from the list of garden tools. The sagacious and observant John Evelyn foresaw the day when this would be the case. "The ancients," he says, "found such benefits in pruning, that they feigned that a goddess presided over it." He tells us in another place that a pruner should be early at his work, quoting Lawson, the orchardist. He says: "All ages, by rules and experience, do consent to pruning and lopping of trees, yet have not any that I know described unto us, except in dark and general words, which or what are those superfluous boughs which we must take away. 'Tis misery to see how our finest trees are defaced!" We recommend, the reader will observe, pruning, but not lopping.

769. Numerous fanciful modes of training wall-fruit have been recommended; but to secure permanently healthy trees, they should be made to assume their natural position as near as possible. First, then, as to Peach and Nectarine trees: the fan system is the best, because that is the most natural form that trees so artificially placed can be made to assume. Much injury is done to trained fruit-trees merely to give them an artistic appearance.

770. Protection to the expected blosson of wall-trees is, however, the great object at this season, and our correspondent H. P. D., suggests as folllows:—In our cold and uncertain climate, all sorts of wall-trees, especially peaches, nectarines, and apricots, require some protection in the spring, as soon as the blossoms begin to expand. Various expedients for this purpose, all more or less costly, from glass to old fishing-nets, have been adopted; but, in the absence of protected copings, I believe that nothing will be found less costly and more effectual than sprays of Scotch and spruce firs nailed against the wall, or drawn in between the branches, so as to cover the whole face of the trees as soon as the blossom-buds begin to expand. This is far better than tiffany, calico, or any close covering, as it allows the air at all times a free circulation, and adapts itself to the requirements of the advancing season, as the leaflets of the sprays will gradually die off, and, without any trouble of removal, leave the trees quite uncovered by the time the green leaves have made their appearance, and there is no further fear of frost. Some gardeners say, "the best protection is to keep your blossoms out of harm's way," and advise retarding the time of blossoming by any and every means. This is good as far as it goes; but no retarding will permit us with safety to dispense with some covering as a protection from frost. Keep your trees unnailed all the winter,—screen them from the early spring sunshine,—lay bare their roots, heap snow about their stems, and prune late, and nail late also, if you will; and by such means you may retard any tree in blossoming for about a fortnight: but our spring frosts come much later; and while the tree is without

its leaves we should always be prepared, for we never know when the enemy will come.

771. *Apples and Pears.*—Pruning these should now be finished, and this is the last month for planting until the autumn ; the various operations of grafting and budding are now in full progress. This is especially the season for crown-grafting, where it is desired to use some vigorous old tree bearing an indifferent fruit. In this case, the grafts should be taken from the trees before the buds begin to swell.

772. *Root-pruning Expedients.*—If the cause of unfruitfulness be over-luxuriant growth, root-pruning must be resorted to. This, in the case of old trees, is best carried into effect in August, and the readiest means is to dig a trench a few feet from the stem, according to the size of the tree, and to cut all those roots which appear to penetrate deeply into the soil, and which grow beyond the range of the others. This will induce the growth of a number of small fibrous roots at the extremities, which roots, in some way or other, appear connected with the fruitfulness of the tree. Another means of checking too gross a habit is to bore a hole with an auger completely through the stem of the tree, about six inches from the ground, and before the sap begins to rise, filling up the hole so made with a piece of thorn. This will prove an outlet for superabundant sap, and by checking growth will be found frequently to throw the tree into bearing. When one or both of these methods fail, it may be useful, especially in the case of pear-trees, which send out an abundance of tall upright shoots, to bend all the leaders down by tying weights to their extremities. But if none of these expedients is found to answer, and the tree continues vigorous in growth without forming blossom-buds or bearing fruit, all that can be done is to cut off the head and work the stem over again, carefully selecting scions from good bearing trees.—D.

773. *Strawberries.*—British Queens, hitherto protected, should be uncovered now, and the beds weeded, and the plants trimmed ; the soil stirred round the roots with the fork without disturbing the dung. Runners placed in a nursery-bed last autumn should now be removed to where they are to remain for fruiting. Where fruit of a large size are required, open a trench, as if for celery, filled half up with well-rotted dung, and dig it well into the bottom of the trench, and fill in the soil previously taken out, and plant immediately. Where they are planted between dwarf fruit-trees, it is good practice to keep each plant or stool separate for the first two years, and then allow them to cover the ground. Where plants have been growing in the same place for several years, weed the beds well before they begin to grow, stir the soil, and sow some guano over them in showery weather.

774. *Gooseberries and Currant-trees* bear on the young as well as on the two-year-old wood, generally upon small spurs rising along the sides of the branches. In autumn or winter, when digging between the bushes, sow fresh-slaked lime copiously over the whole ground, more particularly round the stems and about the roots, before forking it over. About the latter end of March repeat the operation, raking the ground afterwards. In a fortnight or

three weeks this liming should be repeated, and, except under extreme circumstances, no future attacks from caterpillars need be apprehended. In pruning gooseberry-trees, for which January is a favourable season, keep the tree thin of branches; but let those left be trained to some regular shape, and never permitted to grow ramblingly across each other, but radiating in a cup-like form from their common centre, so as to be six or eight inches apart at the extremities and hollow in the centre. Prune out all worn-out branches, retaining young shoots to supply their places, retaining also, where practicable, a terminal bud to each branch while shortening long stragglers. The same remarks apply to currant-trees. Young gooseberry-trees designed for standards should be pruned back to a clean stem for 10 or 12 inches, retaining the best properly-placed shoots to form the head, cutting out all irregularly-placed shoots, keeping them, as nearly as possible, of the same length and form.

775. In making new plantations, place them eight feet apart each way, if in continuous rows; if intended to be placed round the quarters, or to divide the ground into compartments, prune them up to a clean stem 12 or 14 inches high; otherwise the foliage will impede the growth of the crops sown beneath them. But the best mode of growing gooseberries is as standards, and the bushes should be trained three feet high before they are suffered to form a head. According to the present system of training, the branches are borne to the ground by the weight of the fruit, and its bloom is destroyed by being draggled on the soil and splashed by heavy rains.

§ 6.—The Culture of Flowers under Glass.

776. *The Conservatory.*—The interest and beauty of this house will now increase day by day. Let a minimum temperature of 45° be maintained, allowing for a rise of 10° from sun-heat, and give as much air as the state of the weather and the maintenance of a kindly genial atmosphere will permit. The less fire-heat that is used the longer will the flowers continue in blossom; therefore, in very cold weather, suffer a depression of 5° from the above, rather than increase by artificial heat. Keep the heating apparatus cool in the morning if there is the slightest chance of bright sunshine. Nothing destroys flowers so fast as the sun shining upon a house while the pipes or flues are also in operation: this remark applies to all heated flue-structures, although specially so to conservatories. Flowers reveal its effects sooner, but it is doubtful if they suffer more from this cause than other plants in full growth: in the one case, the effect is apparent at once, in showers of dead flowers; in the other, it is hidden for months, but not the less potent and injurious, except on dull wet days, than when fires are necessary to expel damp, and maintain the temperature while air is freely admitted; lay it down as a rule, that the conservatory fire is drawn right out, or shut off by the valves when that cannot be done, on every morning promising sunshine.

777. *Camellias* in full flower must now be liberally watered at the roots: during the expansion of a heavy crop of buds, the demand on their roots is

very great. Clear weak manure-water will excite them gently; it must, however, be both clear and weak, or it will do harm rather than good, for they seem to have no power of assimilating gross food. The blossoms must on no account be rubbed, touched, or wetted: they show at once any bruise or spot of water on their clear and distinct and delicate petals. Two buds can scarcely be held in the hand at the same time without injury. In cutting the flowers, therefore, each should be placed separate in a basket divided into small compartments, or in pots filled with sand. Immediately after camellias have flowered is the best time for inarching any indifferent or worthless variety with a good sort. This operation is very simple: merely partly cut through the bark into both stock and branch, and unite the wounded parts, binding them tightly together, and fix them securely in one spot, excluding the air from the united part: in two months they will be united for better or worse. At this time, cut the head off the stock, and leave it a few weeks longer to make sure that the junction is perfect. Then cut off the branch, and place the stock with its new head amongst the others as an independent plant: the operation is now completed. Large branches from three inches to three feet high can be attached in this manner, in the course of three months, and most valuable plants secured at once. The stock and branch must always, however, bear a proper relation to each other, and the latter, as a rule, should never exceed the former in thickness.

778. *The Greenhouse.*—Proceed with the shifting of all plants requiring it. Free-growing plants, such as Lischenaultias, Boronias, &c., may be treated on what is termed the one-shift system, provided they are very healthy and the after-treatment is skilful. They require turfy peat, well coloured with gritty silver-sand, and a fourth part of clean sweet leaf-mould. Much of the dirty putrid water and tannin that is used under this designation is enough to kill most plants, and is certain death to hard-wooded species. Therefore, unless the leaf-mould is really good, add none to your compost for hard-wooded plants. In shifting any of these plants or heaths from a 48- to a 16- or 12-sized pot, the soil should be used in a much rougher state than for ordinary potting. The draining must also be more liberal, say at least four inches deep, besides mixing pieces of broken potsherds or charcoal freely with the soil in the process of filling up. The soil should be so dry as never to stick to the fingers, but by no means *quite* dry. It should also be well consolidated as the work goes on, and rammed in with a small rammer, or the bottom of a pot of about the same size, before the plant is inserted. If the soil is of the proper texture, and in a right condition in reference to moisture, it will be almost impossible to make it too firm in potting. The roots of hard-wooded plants seem unable to get hold of loose soil. Much of the veriest twaddle has been written about stirring and patching the surface of soil. When plants are properly rooted, this operation is alike unnecessary and impossible. To secure plenty of roots, thorough drainage is the first desideratum, proper compost the second, firm potting the third, careful watering the fourth, and proper top management the very last point for consideration. Some would probably be inclined to reverse

this order, and put the last first; my experience, however, justifies the order in which I have placed them. Keep the new soil *level* with the top of the old ball. I do not approve of raising the collar above: and to depress it beneath the general level is certain death to hard-wooded plants. All plants, however hardy, should be kept warm and moist for a few weeks after repotting, especially if they have received a large shift. The growth of the roots is thus promoted—a point of great importance at this stage. At first it only occupies the hall of its new dwelling, whence it is easily expelled by accident or disease; but after it has taken possession of the whole house, and fills every available space with its large family of roots, why, the plant is no longer a tenant at will, but a tenant for life, and it requires a violent wrench forcibly to remove it.

779. *Heaths.*—These remarks are applicable to all the free-growing varieties: the potting of the entire family should now be proceeded with.

780. *Pelargoniums* will now require careful training. Remove every dead leaf, thin out superfluous shoots, and keep the plants scrupulously clean. Maintain a temperature of 50°; syringe on fine, bright mornings. If the weather is fine towards the end of the month, sprinkling may be repeated in the afternoon, and the house shut up about four o'clock. Keep the plants close to the glass, and admit air in quantity proportioned to the mildness of the external air. Stop and shift plants for the latest bloom, and put in the toppings for cuttings. Fancy pelargoniums require the same general treatment, but even more care in ventilation and watering.

781. *Cinerarias.*—Keep clean, remove decayed leaves, and throw away all but the most choice varieties as soon as they have finished flowering. Save the best sorts for seed or suckers, and sow seed at once for the earliest plants.

782. *Calceolarias.*—Thin out the worst of the crowded leaves; peg down the shoots to increase the strength of the plants, and sow seed for next year.

783. *Forcing-Pit.*—Introduce fresh batches of azaleas, lilacs, rhododendrons, roses, &c. Remove pinks as soon as they fairly show flower, to a cooler house. Hydrangeas introduced now will force well, and make useful plants for the conservatory. Part of the pit should now be devoted to sowing tender annuals in pens or boxes,—a first sowing of Balsams, Amaranthus, Egg-plants, Mesembryanthemum, Ipomœa, Thunbergias, Primula sinensis, Humea, &c.

784. *Stove.*—Keep a nice growing temperature of from 65° to 70°. If the sun continues very bright throughout the day, houses containing variegated plants will require shading for a few hours about noon. This will be the more necessary after repotting. Clerodendrums, Allamandas, Stephanotis, Ixoras, &c., should now be pushed forward in a sharp bottom-heat. They may receive a liberal shift, and be allowed to grow rather loosely for a time, to encourage a rapid extension of parts. Ferns should now be thoroughly overhauled, examined, shifted into larger pots, or reduced, as circumstances may require: nice fibry peat, leaf-mould, sharp sand, and broken sandstone, suit them well.

785. Now is the time to destroy scale, so troublesome on these beautiful and graceful plants.—D. T. F.

§ 7.—FRUIT-CULTURE UNDER GLASS.

786. March is a peculiarly trying month for forcing. The extreme changeableness of the weather, varying almost every hour, from the fiercest sunshine to the bitterest cold, and both these forces to contend against at once, render the utmost attention necessary. This is the more essential, as at this season the young foliage and fruit are so easily injured. Perfect ventilation may be said to constitute the main feature of successful cultivation throughout the month. The powerful rays of the sun compel us to give air,—the keen withering wind says, Do it at your peril. Both must be obeyed; but a skilful balance, resulting in a genial atmosphere, must be struck between these contending forces. The moment, too, that one ceases to act, the other must be checked. Does a genial mild March day for once occur, then you have only to guard against the sun's rays. Is there no sunshine, then you have the cold air only to combat. This principle must be applied to hours and minutes, as well as days. The moment a black cloud intervenes between your glass and the sun, the air must be excluded; no sooner does the sun emerge from the other side, than air must be admitted. Hence the extraordinary attention required, and labour involved in ventilating houses during the month.

787. March winds are not only cold, but dry. In fact, in mercy to the comfort of men and the well-being of plants, it has been ordained that the colder the air the drier it is. This fact renders it of the utmost importance that every space in forcing-houses should be kept damp during bright weather in the spring month. The inside air is not only to be warm, but it must be kept moist. Every particle of outside air admitted, becomes charged with it, exhausting the moisture so necessary to the existence of the plants, extracting the water out of the leaves, and leaving them thin, dry, and parched. Lay it down then as a principle of universal application, that the less of the cold air admitted this month (consistent with the maintenance of a proper temperature, and a change of atmosphere in the house), the better, and that the more you are compelled to admit, the more water must be used to supply the demand that cold air makes for water. This principle reduced to practice will secure in every plant-structure at all times that greatest of all cultural desiderata, a genial, kindly-growing atmosphere.

788. *Vineries.*—The above remarks are peculiarly applicable to grape vines in the early stages of their growth. When fully expanded, the leaves will bear the strongest sun, and exposure to a cold air in the autumn, without inconvenience; but when young they are very easily injured. The earliest grapes may now b stoning. Don't attempt to hurry them during this process; for, in the first place, you will not succeed, and, in the second, you will certainly weaken the vines. This process occurs when the grapes are about three parts grown, and often causes vexation and disappointment to young beginners. The grapes

make no *visible* progress for six weeks or two months. They are, however, progressing within, forming their seeds, or stoning, as it is technically called. A temperature of 60° at night is enough until this work is completed.

789. *The Pinery.*—Many of the fruiting plants will now be showing flower. Maintain a minimum temperature of 70°, allowing a rise of 10° or 15° in the sun, and a rather dry atmosphere, until the blooming period is over. Drip, or too much water on the blossom, will prevent it setting. Unless it *set*, that pip will not swell, and one pip vacant in a pine destroys the beauty and symmetry of the finest fruit. Water with water at 80° immediately after potting, to prevent the roots receiving a check from the cold soil, and maintaining a nice growing heat of 65° to 70°.

790. *Peaches.*—Guard against sudden or great variations of temperature, and cutting draughts ; and syringe morning and evening as soon as the fruit is set. Begin to disbud the more forward woodbuds, leaving the strongest and best-placed shoots. This disbudding should be done very gradually : say at five or six periods, during the early stages of growth. Early peaches, after they are stoned, will bear a temperature of 70° with safety. They should be exposed to all the light and air possible, consistent with the principles enunciated in the preface to these instructions.

791. *Strawberries.*—There is no better position for these plants during winter than the floor of an orchard-house, cool, dry, and free from frost, which preserves them in a healthy, dormant state. They may now be looked over, top-dressed, raked, and plunged in a pit with a bottom-heat of 50°, giving air in sufficient quantity, dry and bright, to keep the top for another fortnight at 40° to 45°. This will secure a root-action in advance of the top ; so that, when the top *moves* and the trusses appear, plenty of active roots may be ready to minister to its wants. After that period, the temperature in the pit may be raised from 45° to 55° ; and this should not be much exceeded until the fruit are set. They will then bear ten degrees more heat during the ripening period. Plants may also be introduced upon shelves in vineries, &c. ; but a pit for themselves is the best place for them. For succession, introduce a fresh batch of plants every fortnight. Cuthill's Black-friar is a useful, early sort. Nothing, however, is better than Sheen's seedling for the early, and British Queen for the late crops. Instructions for preparing the plants for forcing will appear at the proper time.—D. T. F.

§ 8.—HOTBED AND FRAME CULTIVATION.

792. *Cucumbers.*—Where cucumbers have not already been started, it should be done now, as formerly described, the manure being shaken and turned over three or four times ; for on this everything depends, the heat lasts longer, and the plants are not exposed to violent and irregular heating. When the bed is made, some gardeners recommend its being left a short time to settle, before putting on the frame and lights, in order to prevent violent heating and rapid sinking, from the additional weight of the frame ; but if the bed has

been well turned and beaten down in the process of making, this will hardly be necessary. If the frame is not put on at once, however, it is advisable to cover the bed with litter or mats, in case of heavy rains, which would reduce the temperature of the bed. After the frame is on, place about a bushel of loamy soil under the centre of each light—too much soil at once would induce too much heat. It is an old-fashioned but safe plan to thrust a pointed stick into the bed. By drawing it out occasionally, the temperature of the bed can be ascertained by feeling it: if more exactness is desired, a ground thermometer might be plunged into it. If the plants have been raised in a temporary bed, they may be planted five or six days after the bed is made: they will thus be ready to start into active growth at once. If no plants are ready, sow two seeds each in 3-inch pots, only half-filled with soil at first, and add fresh soil as the plants grow. The soil in which they are to grow should be rather coarse, and by no means sifted. The after-treatment is the same as that described in January.

793. *Melons.*—This is also a good time to make up hotbeds for melons, to ripen in June and July. The soil should be put into the frame at once to the depth of 8 or 10 inches, and trodden or pressed rather firmly, if the dung has been carefully turned and the bed well beaten down in the making. Two plants should be planted under each light, the vines radiating from the centre; or place them further apart, and train the vines back and front, picking off all superfluous soil, and leaving only sufficient to nourish the fruit. Where a cucumber or melon-bed is in full operation, the other seeds may be sown in pots, and placed in them; and when up, repotted, and grown till the beds destined for them are ready: a great saving of time and material is thus effected. Where a good sort is growing, which it is desired to increase, it may either be done by plunging some pots filled with soil, and laying shoots of the vines into them, or by taking off cuttings, and placing three or four round the edge of a pot: they will strike root readily in about the time it takes to raise plants from seed, and bear rather quicker than seedlings.

794. At this time, as formerly, dung-beds must be lined with prepared dung, to maintain the heat; for any decline below the point of safety, which is about 70°, will check the growth of the plants, and throw them back considerably. This applies to the culture ot cucumbers and melons, and of forcing plants generally; but, in the case of plants which are to be turned out later in the season, it is necessary to inure them, by a gradual decrease in that of the frame, to the natural temperature of the air.

795. *Vegetable Marrows* are sown thickly in pots, and placed in a cucumber or melon-frame. When up, they are separated and planted out, two or three in a 4-inch pot, where they may either continue till their final planting out, or separated again, and potted singly, to prevent their getting pot-bound. At the end of March, or early in April, plant them out on a bed of manure of sufficient heat to start them, covering them with hand-glasses. In May plant them out, without any such stimulus, on ridges in the open ground. *Tomatoes* and *Capsicums* are raised in the same manner. They may be planted out

under a south wall, or grown in pots, in frame, pit, or greenhouse, during the summer.

796. *Asparagus.*—Slight hotbeds should still be made for forcing *Potatoes, Asparagus, Seakale, French Beans, Strawberries,* and *Radishes,* or any of these may be planted or sown on an old bed; the old lining removed, and fresh but prepared linings applied to give the necessary heat. If they are forced in a pit, let the dung be well worked, laid in carefully, levelled and beaten down, and filled high enough to allow for sinking. At this time of the year, no other heat than that supplied by the dung in the pit will be necessary; for late spring forcing, brick pits are preferable, on account of their cleanliness.

797. *Salading.*—For a supply of *Mint* or *Parsley,* some roots planted now in a hotbed will produce young shoots or leaves. Some roots of *Horseradish* and *Chicory* planted in the same way, and blanched by excluding the light, may be very useful as salading. A succession of *Mustard-and-Cress* should be sown every week. *Radishes* may still be sown in frames, or in the open air. F. C.

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§ 9.—WINDOW-GARDENING.

798. *Choice of Plants.*—Although this is a matter of taste, it is as well to use a little judgment in the selection; for all plants are not adapted to window-culture: indeed, where windows alone are available, the choice is rather limited. The number may be increased if a frame can be used as an auxiliary for forwarding the plants, placing them in the window as they advance, to replace those which have ceased flowering. In the purchase of plants, it is advisable to deal with respectable growers, who guarantee that the plants are in a healthy condition; for plants may appear flourishing, while, in reality, their days are numbered. Nurserymen who grow plants creditably, and charge a fair price for good ones, are the best to deal with. It is best to be satisfied at first with a few, and begin with such plants as are of easy culture; as the scarlet geranium, which will flourish under any circumstances; but, although it will grow under rough treatment, it requires skill, resulting from practice, to grow it properly; and experience in the culture of one kind of plant soon leads to proficiency in that of most others.

799. Of the plants suitable for various aspects, little need be said,—I find the difference is not so great as might be imagined; but it may be taken as a rule, that a sunny aspect is best for all flowering plants, except in the hot summer months, when they last much longer in bloom if kept in the shade; but it is possible to have blinds fixed to a south window, by which the plants may be shaded, or not, at pleasure. In the culture of some plants, as the Auricula, for instance, it is advisable to give them a sunny aspect from October to May, and a shady one from May to October. Other plants, as Ferns, may be constantly kept in the shade, although a little sun does them no harm, but the contrary. For the window, the Pelargoniums alone afford a

great variety of colours: the scarlets are very effective in foliage, as well as flower. Such kinds as Punch and Wellington Hero are very suitable for window-culture, so are some of the scarlet horseshoe-leaved, as Amazon and Compactum. Christina is a beautiful pink sort, and a very free bloomer; Madame Voucher combines the habit of the scarlet geranium with a pure white flower. The larger-flowered sorts are effective while in bloom, but are not so continuous. Fuchsias are worthy attention, and are mostly continuous bloomers, and of easy culture. Callas, or Arums, make a handsome appearance, whether in bloom or not. Genestas are excellent plants for window-culture, and so are myrtles. These are of easy culture; and, under fair treatment, are very clean and free from insects,—no small advantage where few conveniences are at hand. Bulbs, such as Hyacinths, Dwarf Tulips, Snowdrops, Crocuses, &c., should never be dispensed with; for if bought in good condition, they will never fail to bloom; and a few dozen of them will make a window look gay from February to the end of May: they may be potted or placed in glasses, and will flower with no other convenience than a window; but, with the assistance of a frame, not only a great many may be grown, but a succession of blooming bulbs may be kept up for a long time. In the frame, indeed, many plants may be grown or raised, that would not be tolerated in a room; such as plants raised from seeds, as Mignonette and Nemophila. For violets, auriculas also, and other plants, the frame will be found of great use. In the selection of plants, it is well to consider the position and temperature of the room. For town culture, the Chrysanthemum stands at the head of the list; and many sedums and saxifrages, and such plants as have smooth shiny leaves, are to be preferred. In the open country it may reasonably be supposed that plants of any kind will thrive: it may be observed, also, what plants are known to do best in the neighbourhood. Practised gardeners may be of great use to cottagers, in giving a few kindly hints, in their various localities, in selecting their flowers.

800. *Soil.*—In the choice of soils for pot-culture very much depends, but not in the way generally imagined. A few grim, sooty plants may occasionally be seen occupying a window-ledge, and their appearance ascribed to the smoky atmosphere. This is, in fact, the case to a certain extent, but not wholly so: they are mostly potted in soil taken from a back-yard, impregnated with foul gases, so that plants would not grow in it in the remotest part of the country. In towns, where proper soil can scarcely be met with, it is advisable to purchase it at some suburban nursery; by stating what sort of plant it is required for, no mistake can be made: sixpence will purchase a bushel or so.

801. All soft-wooded plants, such as Geraniums, Fuchsias, Cinerarias, &c., do best in a soil composed of two parts yellow loam, one very rotten dung, one leaf-mould, with sand enough to make it porous; but some plants, such as Ericas, Epacridæ, and Azaleas, require peat; and others, as the Camellia, Daphne, Corræa, a mixture of peat and loam. Although the first-named soil will grow almost any plant, still those that require peat must have it, as no substitute will produce the same effects. It should be observed, that soils

ought not to be sifted, as a rule: to do so is averse to what is observed in nature.

802. *In Potting*, adapt the pots to the size of the plants as near as possible,—or, rather, to what the plant is expected to be,—as allowance must be made for growth of the root as well as the plant. Let the pots be perfectly clean. Effectual drainage of the pots does not consist so much in the quantity of drainage, as in the arrangement of it. A potsherd should be placed over the hole; some pieces of pot, broken rather small, over that; and these again covered with a layer of peat-fibre or rough earth. This gives efficient *drainage*, and need not occupy more than an inch and a half of the pot. Hard-wooded plants should be potted rather firmly; soft-wooded should be left rather loose and free.

803. *In Watering* fresh-potted plants, it is important that the whole of the soil be effectually moistened, which can only be accomplished by filling up two or three times with water. No fear need be entertained of over-watering: if the plants have been rightly potted, all surplus water, beyond what the soil can conveniently retain, will drain away. Irregular watering is frequently the cause of failure in plant-culture, even with experienced growers. A certain amount of tact is necessary in giving plants, which have been so neglected, just as much water as they should have, and no more. In watering, much depends on the weather, and also on the season: they require less in winter than in summer. The proper time to water them in winter is when the plants are in bloom, or growing rapidly,—in summer, as soon as the least dryness appears; but a little practice will be more useful than a lengthy description. In giving air, it may be observed that all plants which are not tender, that is, all plants which are natives of temperate climes, may be exposed to the air at all times when the thermometer indicates a temperature above 40°, except in case of rough winds or heavy rains. Hardy plants may be exposed at any temperature above 32°; for, although frost will not kill them, it may spoil their appearance for a time. Plants in bloom should never be kept close, or exposed to wet or wind: the flowers last longest in a soft, mild atmosphere, free from draught. Plants should never be wetted overhead in cold weather, or, rather, while they are in a cold atmosphere, and never, except to wash off dust, should plants having a soft or woolly foliage be so treated; but some plants, as the Camellia, Myrtles, Heaths, and others with hard leaves, may be plentifully syringed, or watered overhead from a fine rose, in warm weather, especially when in full growth.

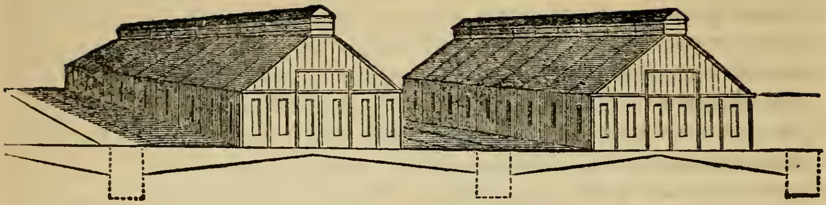
804. *Training*, when required, should be done neatly and tastefully, using thin and pointed sticks, and very fine fibres of matting or soft twine; avoid anything like stiffness or formality, which is the opposite extreme to the graceful habit of plants. The same may be said as to pruning. Cut out such shoots as interfere with the symmetrical outline of the plant; but more may be done by timely disbudding than by cutting. In the frame and window culture of flowers, some like to have a miscellaneous collection, such as will yield them a few flowers throughout the year; others like to grow one parti-

cular genus, or species, as the Auricula, and many private growers excel in the culture of this, so as to surprise experienced gardeners: I have known them grown very fine on a window-ledge. Others take a fancy to the Pink or Carnation;—others again to the different species of violets; and it is chiefly by growing one particular plant that this degree of proficiency is attained, and new varieties given to the world—those improved varieties which are constantly eclipsing old ones. In the management of plant-frames, I find that nothing is better for the bottom or floor, in spite of all that has been said against it, than finely-sifted coal-ashes. The ashes should be firmly trodden down and made perfectly level. So treated, it never gets sloppy, but absorbs all surplus water,—a great consideration. Worms or slugs also dislike crawling through or over it. A plant-frame generally has short legs, or a block projecting below the boarding: these should be sunk in the ground to keep it steady. The glass should be kept quite clean, and there should be room sufficient to admit of drawing the lights off at the back.

805. *Hyacinths* should always find a place in the frame, as much from the certainty of their flowering, as from their rich colour and fragrance, and neat habit when in bloom. They should be potted in September, in a mixture of loam and very rotten dung, witth a liberal allowance of sand, placing one in a 4-inch or three in a 6-inch pot: if they are potted lightly with a little sand under each bulb, no more is required than to place them in the frame, watering or exposing them to gentle showers before the soil gets too dry. Some recommend placing them close together and covering with light earth for a short time: it is a good plan, but not imperative: they will flower in April. Dwarf and early Tulips may be treated in the same way. After flowering, the leaves should never be cut off until they decay naturally, nor should water be withheld until the leaves begin to turn yellow. When the foliage has thoroughly decayed, they should be kept dry till the same time of the year as they were potted, when they may be repotted or only surface-dressed.

806. *Violets* may be grown in pots, by placing two or three runners or offsets in a pot in May, and keeping them in the frame slightly shaded from the hot sun in summer. Loam and leaf-mould suits them admirably. Russian violets, and sometimes the Neapolitan, will flower all the winter. True violets flower in March and April.

807. *Pinks, Cloves, and Carnations* are sometimes grown in pots under frame-treatment: they do well in a soil of gritty loam: they flower in May and June, and some sorts even later. The male pink makes a very pretty pot-plant; so do the Japan and Indian pink. The *Dianthus Heddewegii* makes a fine showy plant when in bloom, and is more permanent than most of them. They are all propagated by seeds or by piping, that is, pulling off three or four joints of each side-shoot, and pricking them into very sandy loam, and keeping them close under glass for a week or two.



RANGE OF ORCHARD-HOUSES.

CHAPTER XIX.

ORCHARD-HOUSES.

808. THE orchard-house is a very simple, but, nevertheless, a distinctive structure, perfectly efficient for all practical purposes, and its projector claims for it that it confers all the benefits of a warm climate without their sometimes oppressive heat. Mr. Rivers was led to adopt orchard-house cultivation by observing the effect produced on some figs in pots, which he had occasion to turn out of a greenhouse, and which were accidentally placed on a border in another house. The roots penetrated through the drainage-hole in the bottom of the pot, and spread themselves over the border, giving to the plants an unusually vigorous and healthy growth. In due season the pots were taken up, and the external roots pruned close with a sharp knife, and placed on a shelf suitable for them during their season of rest.

809. The following spring they were placed in the same border, but, by enlarging the drainage-hole, an increased growth of the roots was encouraged. The result justified his expectations: an unusual display of fruit followed the experiment. He now reasoned that if figs could be grown in small pots, by supplying extra nourishment, why not peaches, nectarines, pears, and other fruit. This he now does to a large extent, with the certainty of a crop proportioned to his exertions.

810. A visit to Mr. Rivers's grounds, to which he invites all comers with so much hospitality, is at first rather disappointing, and it is necessary to recall the fact, from time to time, that Mr. Rivers's business is to grow and sell trees, and not fruit. Nevertheless, in the course of a walk round the grounds, the visitor cannot but be satisfied that all the statements as to the productiveness of his orchard-houses can be verified. He carries you to a small house, which is nothing more than a pit dug in the ground, the soil being a fine rich sandy loam, and over the pit, some 10 feet wide, a range of ordinary frame-lights, about 10 or 12 feet long, are raised, so as to form a sort of lean-to roofed house, which probably cost, with the ends and doors, a matter of £10.

In this house, last July, we had the pleasure of tasting most delicious figs and white Frontignac grapes, then perfectly ripe, which had been grown in it without the slightest aid from artificial heat, as we understood.

811. In ranging over the grounds, a few orchard-houses present themselves, —plain useful buildings, generally span-roofed; but the demand for trees has evidently interfered with their show of fruit, being all half-empty, and, as we said before, they just exhibited enough of the system to satisfy us of what it is capable; taking with us, however, this important reservation, that Mr. Rivers is so happily placed in respect to situation, that, in his own grounds alone, he has five or six different soils of a most fertile description, in which all fruit-trees grow naturally, and in great luxuriance.

812. Mr. Rivers describes, as a convenient form of house, a lean-to structure, 30 feet long and 12 feet 6 inches wide, made in the following simple manner: Six posts of yellow deal, 5 inches by 3, or oak posts, 4 inches by 3, and 9 feet 6 inches in length, are firmly fixed, and driven 2 feet into the ground, the lower ends being previously charred and coated with coal-tar. This is the back line of posts. Six other posts, exactly similar, but only 4 feet 6 inches long, are fixed 18 inches in the ground, forming the front posts of the house,—the one rising 3 feet and the other 7 feet 6 inches above the ground-level. Two posts at one end occupy the centre, and form the door-posts. On the six posts, both in back and front, a wall-plate is nailed to receive the rafters, one of which springs from each of the six front posts, resting on the corresponding back post.

813. The rafters are 14 feet long. A 9-inch deal, 3 inches thick, will make four of them. On the upper side of each rafter is nailed a slip of ½-inch deal, 1¼ inch wide, which will leave ½ an inch on each side as rebate to receive the glass. The rafters so prepared are fixed in their place to the wall-plates by having a piece cut out at each end to correspond with the angle of the back and front plates. They are then firmly nailed, at back and front, by a strong spike-nail, leaving a space between each rafter of 5 feet, which is called a bay; this is filled up by smaller rafters or sash-bars, of a size proportioned to their length and the use they are to be put to,—vines trained to them requiring stronger bars. A piece of ¾-inch deal board, 6 inches wide, nailed along the top of each rafter, so as to be even with their upper edges, forms the ridge-board, leaving a groove to receive the upper end of the glass. A similar piece of inch deal, 6 inches wide, let in by sawing a corresponding piece out of each rafter, will receive the glass and carry off the water. The placing the glass is a very simple process: beginning at the top, a plate of glass, 20 inches wide, is laid in the groove, and fixed in its place by a brad driven into the rafter, a bed of putty being first laid; and so on till the whole is covered in,—open joints in the glass being rather advantageous than otherwise, it not too wide. No putty is used in the laps. The ends of the houses are fitted up to correspond with the roof, only that above the doorway a large sash is fitted in for ventilation. These sashes at each end, and the front or side sashes, are said by Mr. Rivers to be quite sufficient; indeed, he pronounces the ven-

tilation perfect. Well-seasoned ¾-inch deal, planed and jointed, nailed outside the posts, forms the lower part of the house.

814. In the back wall, sliding shutters, 3 feet by 1, will afford ventilation to the roof; and about 3 feet from the surface of the ground, two similar sliding shutters will ventilate the lower part of the house behind, and on a level with them. Ventilation is secured by sashes 2 feet 6 inches wide, and running the whole length of the house under the wall-plate; below these sashes the space is filled in with boarding, well painted. In summer, it is impossible to give too much air. The house is now complete, except the door, which must open inwards for obvious reasons, and may be half glass, or otherwise, at the proprietor's discretion.

815. Within the house, a trench, 18 inches deep, is formed, to which two steps from the outside will lead. This leaves a platform or border on each side of 4 feet 9 inches; the back border requires to beraised 18 inches, and Mr. Rivers suggests that it would be improved by a second terrace behind the first, of 14 inches, supported by a 4-inch brick wall, so that the back row of trees need not be shaded while they are brought nearer to the glass.

816. Now, everything depends upon these borders; their surface loose and open, formed of old lime-rubbish and road-sand, mixed with manure, may be laid 4 inches deep, the whole forked over, and well mixed with the soil, 9 inches deep. The estimate for this house, as given by Mr. Rivers, is £28. 5*s*. A handy person with his tools could probably do the whole for much less; at least, the material and glass, calculated at the prices in Montgomery's list of sash-bars and rafters, are under £15. We have described this lean-to house. Here is Mr. Rivers's description of a span-roofed house, which comprises the advantage of border as well as pot-cultivation:—Height at sides, 5 feet; height of ridge, 9 feet; width, 14 feet. The roof rests on oak posts 5 inches by 3 inches. The rafters are 20 inches apart; it is glazed with 16-oz. glass, in 20-inch squares. Under the eave-boards, the sides, back and front, are filled in with glass 15 inches deep, joined without putty. Under this is a ventilating-board, on hinges, opening downwards; below this are ¾-inch boards, to the ground; the two ends are glazed to the same level as the side-lights; the doors, with glass sash, opening inwards. Over the door, an angular space, 9 inches deep, is found sufficient for roof-ventilation; the rafters, 3-inch by 1½-inch stuff, are tied at the top with a light iron tie screwed to the rafters. No putty is placed in the laps of the glass, which serves every purpose of roof-ventilation found necessary in this house. The only ventilator is the shutter, 1 foot deep on each side, and 2 feet 6 inches from the ground, and the angular opening over each door.

817. The borders in such a roof need not be raised, nor the path sunk, except as a matter of choice; they should have a dressing of manure and sand, or manure and burnt soil, or any loose material well forked over, and mixed with a dressing to the depth of 6 inches, composed of the top spit of a pasture of tenacious loamy soil, which has been exposed to the air for the summer months, mixed with one-third of well-rotted manure, chopped up into

lumps as big as an egg. In the border thus composed, two rows of trees may be placed ; the front row 3 feet apart ; the second being in the rear, zigzag-fashion, but half-way between, so that they are each 3 feet from stem to stem, and none shading the other. Such a house as this, without artificial heat, is intended for protection only, and not for forcing; but it would, Mr. Rivers thinks, grow oranges and camellias successfully, if the house could be heated in very severe weather so as to prevent it falling at any time below 26°. The most severe frost would not injure tea-scented roses so sheltered ; but the house is essentially intended for the protection of fruit-trees, whether planted in the borders or in pots, and has the effect of bringing us, without artificial heat, to the temperature of Angers, in the south of France, where the royal muscadine grape usually ripens in the open air on the 25th of August.

818. The use Mr. Rivers proposes to make of the first structure is the culture of peaches, vines, and figs, in pots. Selecting a straight-stemmed maiden peach or nectarine, well furnished with lateral buds, and not more than four or five feet high, it is planted in an 11-inch pot, and each lateral shoot is cut in to two buds. As soon as the shoots have made three leaves, the third is pinched off, leaving two, not reckoning, however, one or two small leaves generally found at the base of each shoot. These pinched shoots soon put forth a fresh crop of buds, each of which, and all succeeding ones, must be pinched off to one leaf as soon as two or three leaves are formed.

819. "This incessant pinching off the shoots of a potted pyramid-tree, in the climate of an orchard-house, will, in one season, form a compact cypress-like tree, crowded with short fruit-spurs." In spring, these will require to be thinned, and every season the shoots will require to be pinched off as above described.

820. Dwarf, pyramidal, peach, and nectarine trees, may also be planted in the border, two feet apart, with excellent results. They require the same incessant pinching, and must be *lifted and replanted* annually in October; but the span-roofed house is better adapted to the culture of trees planted in the borders.

821. Peaches and nectarines, planted as pyramids in the border, require to be lifted annually, and replanted with a little fresh compost the last week in October. Miniature peach, nectarine, and apricot-trees, grafted on the black damask plum stock, are placed in a garden-frame in January. As soon as their young shoots have made four leaves, their ends are pinched off, leaving their leaves, and all succeeding shoots, pinched off to one leaf. In January, the house must be closed day and night. If at any time the registering thermometer indicates a night temperature of 20°, some dry hay or litter should be placed among and over the pots or borders. If the trees are inclined to shrivel from drought, give a quart of water in the morning. If snow falls, clear the glass of it. In bright sunny weather, open the ventilators to check early buds from swelling. Paint every bud and shoot, before it swells, with Gishurst's compound, half a pound to the gallon of water, to destroy eggs of insects.

822. Continuing the mode of culture recommended by Mr. Rivers from the autumn after grafting, till the fourth or fifth year, when it is beginning to show fruit-buds, these, which it is the object of this training to promote, are distributed along the branches, in their whole length, in spur-bearing fruit, as the apple and pear. In the peach tribe, short spur-like shoots appear towards the end of August, bearing triple buds,—a plump silvery one on each side, and a thin one in the centre. This central bud is the terminal leaf-bud; the two others, blossom-buds, which, in March, will have opened their silvery coat, showing the bright pink of the blossom. These indications appear in the third year after planting. Their development is promoted by carefully watching every branch, checking the more vigorous shoots by pinching off the terminal buds, or by breaking or half-breaking them, so as to check the flow of the sap. The work of pruning begins with the second year's growth. In the winter following, the terminal branches will present a series of small shoots more or less vigorous, and the required pruning will be according to their vigour; repressing the stronger as early as possible by pinching off the leading shoots, and encouraging the weaker shoots; thus balancing the growth of the tree, and suffering no more branches or leaves to be produced than can properly perform their function of elaborating and storing up matter for the production of fruit,—a function for which a full exposure of every part of the tree to light and air is quite essential. It is the pruner's work to remove all shoots which do not fulfil this condition, by rubbing them off, and arresting the over-luxuriant ones by timely pinching off the terminal bud. Others, suited for his purpose, he leaves at their full length, merely depressing their points, which will induce them to push from every bud fruitful twigs of moderate growth, or he prunes back a weak shoot to two or three buds, raising the point in a perpendicular direction, knowing that the sap may thus be concentrated so as to produce a more vigorous growth. If he wishes to increase the vigour of his trees, he will prune them early in autumn, so that the sap they may accumulate in the winter is not thrown away; he studies, in fact, the ways and means of the tree; nor does he forget that the roots should be under control as well as the branches. The treatment should be preventive as well as remedial; the latter, indeed, as Mr. Rivers tells us, "is out of place in a well-ordered garden,—the finger and thumb, and a moderate-sized penknife, should do all the pruning required."

823. Sir Joseph Paxton's houses, which we have described elsewhere, may be so extended as to form an excellent range of orchard-houses at a comparatively small cost, while the crops of fruit and vegetables are not only excellent in quality, but certain in their results, no matter how unpropitious the season. A winter garden of this description, on a large scale, has been erected lately at Summerfield, for R. L. Chance, Esq., from which, with judicious management, Sir Joseph expects great results. It consists of a range of span roofs of 14-foot sashes, which occupy the centre of the garden in the form of a quadrangle, connected with the house by a corridor, formed of the same

sashes, so arranged with lean-tos against the walls as to form an extensive promenade, several hundred feet in length, terminating in a similar range of lean-tos placed against the outside of the south wall. Groves of fruit-trees planted near the side of the walks of the span roofs fill up all the available space ; grapes hang overhead, and vines and other fruits in pots occupy different parts : late and early vegetables are to form an important feature during the winter and early spring. The walks are made of neat paving-tiles, forming at once a cheap and beautiful tesselated pavement ; the whole range of winter gardens, when in blossom or fruit, forming, as may well be imagined, a most enchanting scene when contrasted with the cold and biting atmosphere outside, while the centre of the quadrangle is treated as an ordinary out-of-door garden.

824. Let us here explain that the reference to fig. 6, in paragraph 674, should have been fig. 7, that being the 8-foot sash house referred to.

825. The engraving at the head of this chapter represents another range of orchard-houses, proposed by Mr. Russell, gardener to Col. Aimes, of the Hyde, near St. Albans.

826. "The houses," Mr. Russell tells us, in a communication to the *Gardener's Chronicle*, "might be of any size required ; but I think for peaches, nectarines, apricots, cherries, &c., 12 feet in breadth would be sufficient, with 12 feet between the rows of houses : this would allow about six feet inside on each side, and six feet outside for the roots of the trees, which I consider ample for any sort of fruit-tree. The houses should be just sufficiently high in the middle to allow a tall gentleman to walk through upright ; thus the trees would be convenient for training without the aid of steps ; there would also be every convenience for regulating the roots as well as the branches. The water from the roofs of the houses and the drains might (if there was no other supply) be conveyed into a tank, which might be made large enough to supply the gardens." Another correspondent of the *Gardener's Chronicle*, rejoicing in the name of Iota, sends his own experience in cheap orchard-house building. "I venture," he says, "to send you an account of one I raised last autumn, which has certainly the merit of economy ; I think also of effective appearance, so far at least as that is necessary in such a structure ; and, thirdly, I hope of efficiency in the fruitful work for which it is designed. Being rather crowded with trees, I looked about for a few whose absence would be rather a benefit than otherwise. I soon found an oak, a lime, and sundry Scotch and larch firs. My own men dug a pit in a very short time in a back part of the garden, and three trees were sawed out at an expense of about £2 : they served for posts, plates, rafters, purlins, boarding, &c. I purchased and used foreign deal to the value of another £2 ; nails and screws, 14*s.* ; carpenter's labour, £2. 17*s.* ; glass, 400 feet, allowing for breakages, carriage, &c., £4 ; putty and paint, say £2 ; but this last is with me a difficult item to reckon, as so much is always being used on the premises. I can make no further charges, for my own gardener and his assistant, with very little hired aid, did the glazing and

painting, &c. Pots and plants are expensive, but they vary in different districts; so the mention of mine will not benefit any one else. The cost of my house then stands thus:—

Wood, sawing, nails, &c.	£4	14	0
Glass, with putty and paint	6	0	0
Carpenter's labour	2	17	0
	13	11	0

My house is 30 feet long by 12 feet wide, inside measure; 9 feet high at back; 3 feet 3 inches in front, weather-boarded. The back is tarred; front, sides, and roof, painted with anti-corrosive paint; the inside walls are whitewashed with lime. This rather washes off with hard syringing. I am doubtful whether next season I shall renew it, mixing some flour of sulphur with the lime to keep off the red spider, or whether I shall paint it. The path was dug out to about a foot depth below the door-sill, but nearly filled up again with dry stones, which were well gas-tarred, and then covered with clean gravel. The borders on each side are raised and boarded,—the front, one foot; the back, 1 foot 6 inches. This I think adds very much to appearance and convenience, the trees coming close up to your hand for the numerous manipulations required, and being seen very much better; they are also nearer the glass, and no shade is thrown from the front border plants on those of the back border. I have four sliding shutters at the back, a board to let down the whole distance in front, also a small ventilator in the boarded side opposite the door. My plants in 16-inch and 11-inch pots stand diamond-wise on each border, and between the large pots at the back I have planted in the border a few trees for training up the back of the house, which I shall keep in check by lifting and root-pruning. I have a ledge for strawberries about six inches below the front shutter, holding about fifty plants, and another hundred are placed between the large pots on the borders; they are blooming and setting fruit abundantly."

827. The returns for a much greater outlay than is here contemplated will be gathered from a communication on the subject by Mr. Morris, gardener to Mr. White, of Wethersfield Manor-House, Essex. In 1851, an orchard-house, 80 feet long by 12 feet wide, was put up, having a faggot back; and eleven trees were planted in that space as permanent ones. They began to bear in 1852, and in 1854 Mr. Rivers saw them just after the gardener had commenced gathering fruit. At this time Mr. Rivers considered that there could not be less than 5,000 or 6,000 peaches and nectarines on the trees, besides what had been removed. In 1858, Mr. Morris states that "the trees have produced heavy crops ever since." So much for trees planted in the open border. To this statement, so creditable to Mr. Morris, one of the carpers, who hang on the skirts of all improvements, suggests that such a house to a market-gardener must be a source of great profit, but "for a gentleman to surfeit himself and his friends with fruit for eight or nine days in autumn

would never do, while his gardener could, by potting a few well-grown trees in summer, placing them from time to time in his forcing-house, produce him fine ripe fruit from June to October, by leaving Royal George and Noblesse peaches and Moor-park apricots out of doors in July, so as to retard them." But the advocate for orchard-houses has his answer. There is a range of peach and nectarine houses at Wethersfield for early forcing, but, as a matter of fact, he supplied the family table with fruit from August 9th till November, from the orchard-house to which exception is taken, and from trees planted in the border. From the manner in which the trees were planted, two crops were taken from each tree ; one side being so placed as to be from 15° to 20° colder than the other ; and if he were to add an early York peach to his collection, Mr. Morris adds, he could have ripe fruit a fortnight earlier.

828. For more humble gardeners, who cannot afford even one of these very cheap orchard-houses, here is a hint we have picked somewhere in looking over the books :—" Take two or three of the lights used in a common frame ; support their upper ends against a south wall, on which a full-grown healthy peach or nectarine is trained, just as the buds are swelling and about to blossom. Let the bottom rail stand three feet from the ground and three feet from the wall, supported by a strong stake driven into the earth at each corner. Protect the bottom and ends by mats of wheat straw, made in the manner recommended at par. 718. Give air on every fine day, and watch it so as to supply moisture ; remove decaying leaves, and guard from insects. When summer is fairly come, let it ripen under a June and July sun, and the finest peach-house in the country will not furnish a more delicate fruit, or in greater proportionate quantity."

* * *

APRIL

CHAPTER XX.

MONTHLY CALENDAR.

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§ 1.—ASPECT OF THE MONTH.

829. THE Aprilis of the Latins, from *aperire*, to unveil oneself, fairly lands us amidst the glories of spring; "with wreaths of the rainbow and sandals of green." The opening buds and blossoms respond to the returning warmth of the sun, although in our northern and sea-girt climate there is, perhaps, little of that genial temperature which suggested the name to the Romans. However, many a grassy lane and green bank, and unfolding blossom,—many a daisied lawn and meadow, profusely embroidered with the white blossoms of the snow-flake and wind-flower, indicate the presence of spring. In the garden, the delicate blossoms of the almond, as yet unrelieved by other foliage, are its solitary harbingers; but, before the end of the month, this will be varied by the still more beautiful blossom of the apple, and the walls will be enriched by the opening blossom of the peach and apricot, and the whole of their fellows. The blossoms of the fruit-trees render the April garden a very grove

of flowers, not the less welcome that they hold out promise of a fruitful autumn.

"All Nature stirs: slugs leave their lair;
The bees are stirring; birds are on the wing;
And Winter, slumbering in the open air,
Wears on his smiling face a dream of Spring."

830. The elm-trees are now assuming their new and graceful garment of eaves, the blossoms of the horse-chestnut are expanding in their fan-like sheath, and the cone-shaped terminations of the lilac are swollen almost to bursting in every shrubbery. Many wild auriculas are now in flower, the double furze is now in all its brightness, and the wild hyacinths abundant in many a wooded dell.

"Shade-loving Hyacinth, thou com'st again,
And thy rich odours seem to swell the gale."

Thrice welcome, then, thou laughing, romping, joyful, hopeful April! Thy bright genial smile unlocks the cold grasp of winter, and the biting, shivering winds of March are forgotten as we bask ourselves among thy warm and cheerful beams. Beautiful emblem of childhood and youth, strange co-mixture of smiles and tears, joys and sorrows, mirth and melancholy—great fosterer of growth—come in all thy cheerful gaiety, in all thy fascinating loveliness, in all thy vivifying power, and chase away the thin, haggard, care-worn, woe-begone face of winter from our gardens, and bid our sorely-tried shrubs, trees, and flowers, live a new and beauteous life. During this month, in the language of Dickens, slightly altered, a celestial presence brightens everything. After thy quickening showers, the cornfields, hedgerows, checkered roofs, steepled churches, leaping streams, gladdened gardens—all spring out of the gloomy darkness, smiling. Birds sing sweetly, flowers raise their drooping heads, fresh scents arise in the air, and a rainbow spirit of all the colours that adorn the earth and sky, spans the whole arch with its triumphant glory,"—

"Muttering magic and playing earth-spells,
Mixing her charms over woodlands and bowers,
Throwing her seeds in, and taking out flowers,
Nursing the blooms that she seeth not fade,
For she passeth away ere a bud has decay'd."

831. The variations in the temperature are still very great, the thermometer ranging from 75° to a degree or two below the freezing-point in the meridian of London; the mean maximum of an average of ten years being 57·82° in the atmosphere, and the mean minimum being 35·33°; the temperature being lowest at sunrise; there being, on an average of ten years, six frosty nights in the month. An unusual fall of rain in April is supposed to indicate a dry season for the harvest.

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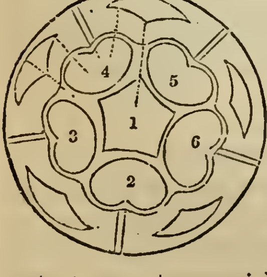
§ 2.—FLOWER-GARDEN AND SHRUBBERIES.

832. Garden pursuits, at all times so pleasant and delightful, now become fascinating in the extreme. New features of interest and fresh scenes of beauty open around us every day, and the teeming earth heaves with its myriad births of vegetable life. The great spirit of life encircles the whole

earth with his presence. He goeth about tapping at dormant buds, shifting roots, coiled-up leaves, and dead-like stems; and they at once spring forth from their winter's sleep, and leap out of their winter's clothing; and there is such a display of company, with new dresses and new fashions, as is never seen but in April. I think the same spirit gives most lovers of gardening a tap also as he passes. Certain it is that their energies are generally stimulated to the full during the month; and it is well that it is so, for so many new visitors make large demands, and protection, food, and training are still necessary to ward off disaster and save from ruin. The number of plants increases daily during the month. Even seeds stored away in dry papers and closely-shut drawers have felt the warm breath of the spirit of life, and are tapping at the prison bars with earnest entreaties —"Let us also live! Life! life!—we are dying for want of life!" Let us first of all attend to them, and place them where their coiled-up vitality may unwind itself into the perfect structure of vegetable life—in other words, become living plants. All seeds intended to flower during the summer should be sown during this month. Lists and descriptions have already appeared of hardy annuals. In places where they are extensively grown, another sowing might be made this month. It would be best to sow now where they are intended to remain. The modern system of furnishing the flower-garden has limited the use of annuals. In gardens, however, where the family may not be always at home, or where the proprietor is indifferent to more permanent and durable flowers, a very brilliant display may be made for several months with annuals.

833. Swindon, in his "Beauties of Flora," gives some very ingenious ideas of planting, which are repeated in Loudon's "Encyclopædia of Gardening." He gives a list of eighty-nine different sorts, arranged in six different classes. By affixing a number to each sort, he readily indicates on his plans the kinds employed, and their relative position. He also arranges a circular clump, including all the eighty-nine sorts, the six heights being placed in six concentric circles, placing a large persicaria, or oriental mallow, in the centre. The general appearance, he says, is the same on every side, rising gradually from the edge upwards, the highest plants meeting nearly in a point at the centre, and no two flowers of the same colour or shape being seen together. His principle is excellent, and might be of great service, although many of the varieties he specifies are now comparatively worthless.



834. Mr. John Caie, than whom no gardener living occupies a higher position for taste in such matters, has proposed several geometrical flower-gardens of great beauty; he has also laid down plans for furnishing them, so as to have them in flower the greater part of the year. Although his design differs from the accompanying one in many important respects, especially in many of his beds being in pairs, the accom-

panying design will give a general notion of the manner in which he carried out his general idea, which was to show the possibility of avoiding acute-angled beds, while retaining ample variety of outline; fig. 7 being represented by the five triangular beds within the outer circle.

835. Arrangement for—

February and March.

1. Helleborus niger,—white and pink.
2. Beds of Crocus reticulatus,—blue.
3. Eranthis hiemalis,—yellow.
4. Galanthus plicatus,—white.
5. Narcissus minor,—yellow.
6. Erythronium Dens canis albiflorum,—white.
7. ,, Dens canis,—purple.

April and May.

1. Anemone apennina,—blue.
2. Arabis præcox,—white.
3. Cheiranthus alpinus,—yellow.
4. Aubrietia purpurea,—lilac.
5. Alyssum saxatile,—yellow.
6. Iberis saxatilis,—white.
7. Tulipa oculus solis,—red and black.

Hardy Annuals for April and May.

1. Silene pendula,—pink.
2. Nemophila atomaria,—white.
3. ,, insignis,—blue.
4. Escholtzia crocea,—orange-yellow.
5. Collinsia grandiflora,—blue-purple.
6. ,, bicolor,—white and lilac.
7. Clarkia pulchella alba,—white.

May to November.

1. Geranium Lucia-rosea,—rose.
2. Verbena, Princess Royal,—white.
3. ,, Heloise,—dark lilac.
4. ,, White Perfection,—white.
5. ,, Duke d'Aumale,—bluish.
6. Calceolaria viscosissima,—yellow.
7. Verbena,—Robinson's Defiance, scarlet.

Perhaps some more recent varieties of the Verbenas, Clarkias, Geraniums, and Calceolarias, might be substituted with advantage; but the kinds named are very beautiful in masses. Fancy ribbon borders could easily be formed with annuals. Cheapness, worth, and beauty, may be happily combined here. For a ribbon of two strips of colour, sow *Clarkia pulchella alba,* and *Clarkia pulchella,* in two separate rows 13 inches apart. For three bands of colour, sow *Nemophila insignis* in front; *Sanvitalia procumbens* or *Bartonia aurea,* second; and Purple Candytuft third. Or White Alyssum first, Virginian Stocks second, and *Escholtzia californica* third. Three rows of Nemophila alone would form a pretty ribbon,—*insignis* in front; 2. *maculata;* 3. *discoidalis.* For four bands or strips of colour, sow *Nemophila insignis* in front; Sweet Alyssum next; *Clarkia pulchella* third; and *Erysimum perofskianum* fourth. If another row is wanted, add Prince's Feather, which will look right regal, towering above the Erysimum. These are not given as the best possible combination, but merely as samples of what any one, for a few pence, and with a yard or two of ground, may accomplish.

836. *Flowering Grasses.*—That splendid importation from the river Plate, *Gynerium argenteum,* or Pampas-grass, should also have some dry strawy litter thrown over it, and a few spruce boughs or evergreen shrubs stuck round, to prevent the litter blowing away. This plant resists the cold of our ordinary seasons, but was in many instances killed during the severity of last winter. Old plants seem hardier than young ones, arising probably from the larger top affording more efficient protection to the roots. The old leaves should not be removed until the end of April, as they afford the best possible protection as far as it goes; only experience shows that of themselves they will not preserve life: hence the necessity of a little extra litter. This is decidedly the king of

all the grasses, and deserves a place in every garden. As the centre group of a *grassery*, or placed in a rich shady dell, contiguous to rocks or water, it would find a congenial home, and impart charming effects to such spots. A rich alluvial soil, at least a yard deep, abundance of space to unfold its large graceful leaves, and throw up its flower-stems, and an unlimited supply of water, are all the conditions its successful culture demands. Nice packets of seed can be bought at one shilling each, and plants that will flower the second year, from nine to twelve shillings a dozen. With liberal treatment, seedlings will flower the third or fourth year. By sowing thinly in February or March in pots, and planting out in prepared beds in May, a season may almost be gained in the growth of the plants. Like all the grasses, the seed should be barely covered with soil, and the surface kept moist, until germination is insured. There seem, however, to be several varieties of this grass, in addition to its sexual distinctions. When practicable, it is therefore best to purchase divided plants from those who have grown the finest flower-stems: it can be rapidly increased by division. I have just cut up a four-year-old plant into a dozen, which I expect to throw up two or three flower-stems apiece during the coming summer. Plants thus divided are more tender than others, and will require more protection, until they are thoroughly established. Few plants, however, are more worthy of attention, as they have a fine appearance when growing; and if the flower-stem is cut before it begins to fade, they look almost as noble when dry. In addition to the localities I have pointed out for them, they also contrast admirably with large masses of yews or other dark-foliaged shrubs. A companion grass to this, with broad-striped foliage and large feathery flowers, is the *Erianthis ravenna.* The Tussack-grass, and some of the common reeds, and rushes, would also form beautiful features in connection with these. There are also eight or ten varieties of the *Holcus saccharatus*, or sugar-cane, whose elegant leaves, stately stems, and various-coloured heads of corn, are highly ornamental. These are half-hardy annuals, and should be sown at once in a gentle heat, and pushed rapidly forward to secure strong plants for planting out in May. The variegated, white-striped, and beautifully-marbled *Zea*, or maize, require similar treatment, and have a charming effect. The pretty millet-grass (*Milium effusum*), charming love-grasses (*Eragrostis elegans, E. Memaquensis*, and *E. Pursthi*), and the several varieties of *Briza*, or quaking grass, should also be sown now, either in pots or on a rather sheltered bed out of doors. Two more beautiful annual grasses are the *Brizopyrum siculum*, whose branches rival in beauty the deciduous cypress, and *Bromus brizoporoides*, so useful for bouquets. The two feather-grasses, *Stipa pinnata* and *S. gigantea*, hardy perennials, and the hardy biennial *Hordeum jubatum*, are also most useful for mixing with other flowers, and very elegant in themselves. The smallest feather-grass almost rivals the *Festuca glauca* for edgings. The handsome silver foliage of the *Festuca* contrasts beautifully with red gravel walks, and is said to harbour fewer vermin than box or any other living edging whatever. Tufts can be purchased for 1*s*. 6*d*. a dozen or 15*s*. per hundred. It is neat, graceful, and easily kept, the only attention required being to cut off the flower-stems in summer, which maintains the leaves in health and beauty.

837. Any planting during this month in the shrubberies must be accompanied with copious watering. But rhododendrons may still be planted, either singly or in masses.

838. *Rose-Garden.*—All pruning and any planting not done last month must be finished early in this, and all recently-planted trees copiously watered, and the ground stirred, but left rough,—at least unraked. Beds for tea-scented roses, prepared for planting towards the end of this month or in May. The following descriptive list of a few Noisette, Bourbon, China, and tea-scented roses, will be found excellent.

839. *Noisette Roses.*—Of all the Noisette roses, nothing can equal Cloth of Gold and Solfaterre. The first does not bloom so freely as the other, but it is superlative when it does bloom. Both of them do best when allowed to grow freely without much pruning; and, unless in the extreme south of England, both require a wall with a south or west aspect. During severe weather they should also be protected. Last winter killed these roses almost everywhere. Both are similar in colour,—a bright sulphur, and alike large in size. Cloth of Gold is the most compact and largest bud, and of a deeper yellow shade. Nothing can exceed it in all the best properties of the rose.—

Lamarque,—very fine, almost white, very large when fully expanded.
Smith's yellow,—beautiful straw-colour, very large.
Triomphe de Rennes,—fine canary, large and full.
Triomphe de la Duchère,—pale rose, blooms in large clusters.
Ophirie,—very peculiar-formed, and unique-coloured rose, bright salmon and fawn.
Jaune Desprez,—fawn and yellow, tinted with rose, very fragrant.
Aimée Vibert,—a universal favourite, puce, white, in large clusters, full flower, very hardy.
Marie Chargé,—bright fawn, tinted with crimson; a better shape than Ophirie.
Nemesis,—deep crimson, dwarf, and delicate.
America,—creamy yellow, large and full.
Madame Massot,—pure white, in clusters.
Octavie,—bright red, distinct and pretty.
Bouquet tout fait,—creamy white, large clusters, very sweet.
Fellenberg,—bright crimson, brilliant.

840. *Bourbon Roses.*—These bloom more freely in the autumn than even the hybrid perpetuals, and most of them are quite hardy even in the extreme North of England. They are deficient generally in shape and fragrance, but brilliant in colour. They are extremely well adapted for planting in large masses, as half-standards or dwarf, or for furnishing complete beds of one colour. Several of these, such as Souvenir de la Malmaison, Victor Emmanuel, Madame Comtesse, Modèle de Perfection, Catherine Guillot, &c., have also a good form. Souvenir de la Malmaison, a large bright flesh-coloured flower, is exquisite in bud, and one of the very best roses grown. I have seen some splendid beds of it during the summer. Gloire des Rosamenses is beautiful in bud,—a bright crimson scarlet. It is only semi-double when expanded. During Mr. Beaton's able reign at Shrubland Gardens, this rose was used with excellent effect as a hedge inclosing a chaste verbena-garden. When I first saw it, it literally dazzled one with its rich and glowing beauty, and it has

been a great favourite with me ever since. The following are good Bourbon roses :—

Acidalie,—bluish-white, large and globular; does not expand well on some soils.
Adelaide Bougère,—dark velvety purple, fine.
Baronne de Noirmont,—fine form, beautiful rose.
Bouquet de Flore,—deep carmine, good habit.
Dupetit Thouars,—vivid crimson; one of the best when it opens well.
Gloire de Paris,—deep carmine, shaded with purple, large and double.
Empress Eugénie,—rosy blush, large and full.
George Peabody,—cupped, purplish-crimson.
Louise Odier,—bright rose, good shape, excellent habit.
Menoux,—brilliant glowing carmine.
Paul Joseph,—velvety, rich crimson.
Sir J. Paxton,—brilliant rose, robust grower.
Queen of Bourbons,—fawn-coloured, most abundant bloomer, beautiful in bud, flimsy when open.
Souvenir de l'Exposition,—rich crimson, very dark.
Vorace,—large, fine, brilliant crimson.

841. *China Roses.*—The common and crimson China are very beautiful, either grown in beds or on walls. Among groups of bedding-plants mixed with Cérise Unique, or Lady Middleton geranium, the common China rose, edged with the crimson, and surrounded with a white band of Alyssum or *Cerastium tomentosum*, is very effective, distinct, and striking. Towards the end of May or beginning of June, they will be in full beauty, and the mass of blush pink, with the setting I have described, is peculiarly soft and beautiful. By cutting off the flowering-stems as soon as they begin to fade, a succession of flowers will be secured throughout the summer. If, however, a short hiatus should intervene, the geraniums will fill up the gap; and the varieties I have named have the merit of harmonizing nicely with the roses. Several other China roses form beautiful groups for the flower-garden. The best for this purpose are, perhaps, the following :—

Gramoisie Supérieure,—bright crimson.
Clara Sylvain,—pure white, large.
Prince Charles,—bright carmine.
Mrs. Bosanquet,—pale flesh, similar in habit to Bourbon Queen.

The following are also pretty China roses :—

Aimée Plantier,—bright fawn and rose.
Eugene Hardy,—creamy pale blush.
Marjolin,—rich dark crimson.
Madame Breon,—bright rose, large and good.

The whole of the China roses require some protection in winter. Nothing is better than some coal-ashes over the root, say eight inches thick, and a quantity of boughs of spruce, &c., bent over the tops, from six to eight inches in thickness. With this protection, the following tea-roses may be grouped in beds, in a similar manner to the common China roses. The best and hardiest of these delightfully sweet-scented roses, is Gloire de Dijon, a large buff-coloured rose, with orange centre. It resisted a frost here last winter of 12° below zero, both on walls and as standards, when hundreds of the hybrid perpetuals were killed :—

Abricot,—bright rosy fawn.
Bougère,—light rose, large and double.
Goubault,—shaded rose, robust grower.
Maria,—pure white.
Madame Damazin,—bright salmon, free bloomer.
Marshal Bugeaud,—very large, rose-colour.

842. The very best of the tender tea-roses is Devoniensis, a creamy-white,

large, truly magnificent variety: for beauty of bud, size, consistence, and perfume of flower, it stands unrivalled. It has a peculiar odour, all its own; and I would undertake to pick out a flower of Devoniensis out of a hundred by the scent alone. The leaves, too, are beautiful and glossy, the habit good, and for a tea-rose it is a robust grower. I hope your many thousands of readers will secure this rose-plant at once, before the demand raises their price from eighteen pence to half a crown. It will do well in a sheltered situation out of doors in summer; and a clean sunny window will be the spot for it in winter, until the little greenhouse that is to be built. The following are also beautiful varieties of this interesting class:—

Adam,—rose large and splendid.
Barillet Deschamps,—pale lemon, large.
Eliza Sauvage,—pale yellow, with orange centre.
La Boule d'Or,—fine golden yellow.
Le Pactole,—lemon, small.
Madame Bravy,—cream-colour, beautiful, large, and full.
Moire,—rosy fawn, beautifully shaded.
Nipheto,—pure white, lemon centre.
President,—salmon-shaded rose, fine form, large, and double.
Princess Marie,—a large, tender, beautiful rose, well adapted for facing; flowers continue long in bloom.
Safrona,—bright apricot-coloured, very beautiful.
Souvenir d'un Ami,—salmon and rose, large and full, one of the best; good shape.
Souvenir d'Elise,—creamy white, tinted with rose, large and full.
Vicomtesse de Cazes, beautiful bright orange-yellow.

843. For planting out in conservatories, covering walls in arcades, or heated walls covered with glass out of doors, these roses rival the Camellia in beauty of tint, and some of them almost equal it in shape; and then their perfume,—truly nothing can equal it. They also form excellent pot-plants for adorning the greenhouse or conservatory throughout the summer; and, in a warm conservatory, they can be had in flower at almost any time. Their *tenderness* excepted, they require the same general treatment as other roses. They thrive well in a well-drained compost, of equal parts loam, leaf-mould, and peat, and a sixth part broken charcoal and gritty sand. Before starting them in the spring is a good time to pot them; and if they could be plunged for a few weeks after this operation in a gentle bottom-heat of 50°, so much the better. They could then be placed fully exposed to the light on a greenhouse shelf. The pots should be placed in a larger-sized pot, with a layer of moss between, to protect the roots from the heat of the sun. After flowering, the shoots should be cut back to two or three eyes, and any weak old shoots cut entirely out. They will break again directly, and flower several times throughout the season. After their last flowering in September, they may be placed for a month or so exposed to the sun out of doors, to give them a season of rest, and be kept dormant until wanted again in the spring. If required for winter-flowering, however, they must be moved out of doors, and a rest, *if possible* (for it is not always possible), secured earlier; or they may remain under glass to ripen their wood; be pruned at the end of September or beginning of October; kept in a genial temperature of from 50° to 60°, and they will be in flower at Christmas. When growing freely, they enjoy *weak* manure-water; but they are very impatient of an excess of moisture or *gross food*. I think them less liable to the attacks of insects than other roses; but if they appear,

they must be at once destroyed, as nothing should be allowed to tarnish the beauty of their exquisite foliage, which constitutes one of the chief charms of this delightful family of roses.

844. *Gladioli.*—These plants are great favourites here, and they are treated as follows: the grand floral display is in June and July, and, if seed is no object, and the flower-stems are cut down at once, many of the bulbs will throw up a second flower-stem. The stems should only be cut down as far as the first leaf, as the leaves continue fresh and beautiful, and the second flower-stem often proceeds as a lateral from this point. They are easily increased by seed; but, as they are already so numerous, I would advise your readers to leave this mode to the French, who are great cultivators of the Gladioli. In fact, this flower is the chief feature in Parisian gardens, and there is no reason in the world that it should not become a very striking one in our own. The only drawback is, that in the most favourable circumstances a spike of Gladioli will not remain in bloom for longer than two months. I mean to try and vanquish this difficulty this season, by keeping part of the bulbs in a very cool place until May, and placing one *between each* of those planted in March. When taken up in November, they should be put away with their old fibres and some soil adhering to them in a dry room, the temperature not being allowed to sink under 40°. Prepare for planting by carefully rubbing off the old roots and soil adhering at the bottom of the bulb, and carefully save all this *débris;* you will then perceive that each bulb asks you to divide it into two,—sometimes three or four; that is, they will almost split themselves, and will have so many embryo shoots. After dividing and planting your bulbs, examine your *débris,* and you will find hundreds of thousands of little scaly-looking rubbish—no, not rubbish, but young Gladioli. Pick out the old roots and large particles of soil, draw a drill two inches deep on a bit of rich soil in the reserve garden, sow the scales thinly, and there will be such a crop of bulbs as will astonish every reader. Some of these will flower late in the autumn, many of them the second, and all the third year. These young bulbs require exactly the same treatment as the old ones. They also begin forming scales at once, and after the second year they divide their bulbs in the same manner. Let your readers then purchase single bulbs of any or all of the following varieties, and cultivate and propagate them as I have here made known, and Gladioli will soon be as thickly scattered over the country as pins on a baby's pincushion. Their price varies from 5*s.* to 2*d.* each; excellent assortments may be had of most nurserymen from 12*s.* to 18*s.* a dozen.

845. The following varieties, suitable for planting in masses among shrubs, &c., range in price from 1*s.* 6*d.* to 6*s.* a dozen. Some of the Dean of Manchester's interesting experiments on hybridization were made on the Gladioli, a subject which will bring us back to this charming family of flowering bulbs.

Rosa Mundi,—carmine-scarlet.
Queen Victoria,—scarlet and white.
Insignis,—fine crimson.
Psittacinus,—crimson and yellow.
Floribundus maximus,—fine blush, large and fine.
Gandavensis,—orange-scarlet.
Colvilii,—rosy purple.
Cardinalis,—scarlet and white.
Brenchhyensis,—vermilion-scarlet.
Autumnalis,—crimson and yellow.

846. *Florists' Flowers.*—Polyanthuses require protection from sudden storms and cold winds. Auriculas are now come into bloom, and require great attention; the trusses thinned, and deformed pips removed. Weak manure-water should be applied in the mornings, shading the plant afterwards from the sun. Seed should now be sown in shallow pans, and lightly covered with soil, and the pans placed in some gentle heat. Dahlia-roots may now be planted out on the beds, three or four inches deep, and five feet asunder. Tulips protected from cold winds and frosty nights by netting thrown over hoops, and by mats, in severe weather, on the beds, leaving plenty of light and air. Ranunculuses require the soil to be loosened as they come up, and watering with weak manure-water: a watering with lime-water will destroy any worms in the beds.

847. *Carnations* in pots should have the surface stirred, and a little new compost added, and watered with lime-water, to destroy any worms in the soil. Sow seeds in pots or boxes during the month, place them in a west aspect, and cover them with a sheet of glass. Some fine hybrids have lately been raised, between the Anne Boleyn class and the other varieties. *Pansies* will now be interesting: water the fresh-potted plants sparingly, until the roots reach the edge of the pots: top-dress the beds with rotten manure; look for and destroy black slugs; plant out seedlings, and put in cuttings. Tulips must now be protected with canvas or mats in frosty, snowy, or very wet weather, exposing them entirely during every hour of genial sunshine. Stir the surface-soil, watch for mice and other marauders, who seem as fond of the sweet roots as man is of the gorgeous flower of this splendid bulb. Hollyhocks kept in pots during the winter should now be planted out, about six feet apart, in deep rich soil. Cuttings of choice sorts are more tender than seedlings, and would be safer with a little protection for six weeks after planting. Seed may also be sown now in the reserve garden, for autumn-flowering.

848. *Tender Annuals* sown last month should now be pricked out three or four inches apart on a fresh hotbed, prepared as described last month; on this they will grow without interfering with each other for three or four weeks. At the end of this time they must either be transplanted to a fresh hotbed, or thinned by removing every second plant. A hotbed for this removal, made as before directed, should have seven inches' depth of earth laid equally over it; the plants carefully removed with a ball of earth round the roots, and replanted six inches apart, or singly in pots, to be plunged into hotbeds; the whole being lightly watered to settle the earth about the roots. Shade from the sun till rooted, after which give air every day, and water whenever the plants seem to flag. As the plants approach the glass, let the frames be raised about six inches, repeating the operation from time to time, so as to keep the plants a few inches from the glass.

849. *Half-hardy Annuals* may now be sown in warm sunny borders, giving them the protection of hoops and mattings at night and in severe weather, and hardier sorts in the beds and borders, in small patches, where they are to

flower, observing that their position is to be regulated according to their height and colour. The mode of sowing is to form a shallow basin in the soil, such as might be made with the convex side of a breakfast saucer ; in this hollow sow the seeds, and sift half an inch of fine earth over them. Thin out the patches as the plants begin to grow.

850. *Mignonette and ten-week Stocks* may be sown in patches or beds, for transplanting on a warm border in the same manner.

851. *Perennials and Biennials* may still be transplanted. Among these we may name the whole tribe of—Convolvulaceæ, Rockets, Lychnises, Carophylaceæ ; most fibrous-rooted plants ; and the whole may still be increased by dividing the roots, and by offsets, or by seeds, either sown on borders, in beds, or in pots ; watering the patches moderately in dry weather.

852. *Gravel Walks and Lawns.*—Walks should be broken up and turned, if not done last month ; if turned then, roll twice a week at least. Lawns should now be mown once a week, and carefully ; for nothing looks worse than the marks of the scythe on an otherwise smooth lawn. All gaps in box edging should now be made good, well watered, and trimmed. Place stakes to all such plants in the beds as require support, bearing in mind that "as the twig is bent the plant inclines ;" fix the sticks firmly in the ground, bring the stalks to the stake, and tie them neatly but firmly to it, without galling the plant, removing all straggling, broken, or decayed shoots, and keeping all clear of weeds, and raking smooth with a small rake.

§ 3.—The Mixed Flower and Kitchen-Garden.

853. In the mixed garden, where each department of the garden is represented within the inclosure, a border will probably be devoted to herbaceous flowers, while beds for annuals, and clumps for roses, rhododendrons, and other American plants, occupy the lawn. If it is a massed arrangement of beds, the flowers should be selected so as to contrast effectively. There should be a combination of forms consistent with the style of the house, and a sufficient unoccupied space left for such objects as orange-trees, azaleas, and other greenhouse plants in pots during the summer months ; and in propagating plants for massing, decided colours should be chosen and streaky ones avoided. If gravel walks separate the beds in the flower-garden with dwarf box as an edging, cold colours should predominate ; if the beds are divided by grass, warm colours should prevail : a border, however, may be introduced which shall modify either of these and improve the general harmony ; bearing in mind that a small mass of bright-coloured flowers will balance a large mass of flowers more subdued in tint. Arrange the flower-garden so that the colours may appear from various points of sight to cross each other and form an harmonious contrast.

854. In the flower-garden annuals were formerly grouped in abundance, and they are still extensively used to fill up vacancies ; but in well-ordered gardens these have given place to a more beautiful class of plants, which are annually

bedded out; such as scarlet geraniums, fuchsias, calceolarias, petunias, verbenas, and phloxes; and, above all, perpetual and autumnal roses, which can be used for this massing system of culture, for they are no longer summer flowers, but bloom most luxuriantly from June to November, and, when properly cultivated, must always be the most attractive flowers of the garden.

855. *Roses.*—Having selected the sorts of roses suited for the purpose, and of one or two seasons' growth from budding, and having cut off with a sharp knife all damaged root-fibres, we proceed to plant. Good ordinary garden soil will produce the rose large enough for ordinary purposes; but to grow it in perfection, a hole in the ground should be opened two feet square and a foot deep. This station should be filled with a compost consisting of two good-sized spadefuls of thoroughly rotted dung for each plant, mixing it well with the soil. Upon the soil thus prepared the standard rose is placed, the collar just above the level of the surface, and the fibres carefully spread out over the soil. Fill in the remaining soil and replace the turf, treading it gently until it forms a small mound, out of the centre of which the tree rises. A stake is now driven into the ground, near enough to support the stem, which is tied to it.

856. The season for planting may be any time from the fall of the leaf till the buds again begin to swell, in April or the beginning of May. After that there is danger of the tree dying off.

857. In pruning newly-planted roses, the object is to balance the head to the vital powers of the fibrous root, which has not yet thrown out its spongioles, and to give a graceful form to the intended head. If there be only one shoot from the bud, cut it down to two eyes; if there be a regular head formed, cut away every shoot down to the lowest eye that points outward or downward, and cut away all weak shoots or thin ones that come in the way of a better, back to their base, leaving only such as are required to form the head of the tree. When the buds begin to break, rub off all that grow inwards,—all that would cross other branches,—all that are coming weakly, and all that would crowd the head and destroy its cup-like form.

858. As the growth proceeds, examine every bud, every curled leaf and shoot for insect larvæ; for maggots, if not detected at once, soon destroy the vitality of the flower-bud. Do this daily, syringing, also, with a fine rose syringe, very forcibly applied, which may destroy the green-fly, the thrip, and other enemies. If they get established, nothing but hand-picking, washing with tobacco-juice, or smoking with tobacco, will get rid of them. Referring to Mr. Fish's paper at page 308, the reader will find an ample list to select from.

859. On the subject of borders, Mr. Cox, of Redleaf, offers some most excellent and seasonable remarks, in a paper furnished to the *Gardeners' Magazine of Botany.* "Minute attention to details, which, taken by themselves, seem trifling, constitutes the perfection of gardening as a whole," he tells us; and, however comprehensive the general effects, they are only produced by attention to detail. In carrying out these details, he warmly recommends a bed of *Viola arborea,* one of which, nine inches by three, before him, as he

wrote in April, was a "complete carpet of deep purple, with not less than 3,600 blossoms." This violet is propagated by dividing the roots, or by cuttings taken when done flowering in May, and planted out in reserve beds, six inches apart, in a compost of fresh sandy soil and decayed leaves.

860. A similar bed he recommends of Polyanthus and Alpine Auriculas. Hepaticas, red, white, and blue, he also recommends; but these being of slow growth, and only flowering the second year, should be raised in the reserve garden.

861. Our native *Pulmonaria angustifolia, P. officinalis,* and *P. azurea,*—violet, pink, and blue, he recommends, as very pretty and abundant flowerers, not at all particular as to soil.

862. *Erythronium Dens canis albidum,* white, and *E. longifolium,* blue, are bulbs which increase very fast, and form beautiful beds when massed. Anenomes, double and single, of every shade, are also beautiful objects. *A. stellata,* a bright scarlet, remainining in the ground the whole year, is increased by offsets, which should be planted out in the reserve garden. Hyacinths are beautiful and desirable in every respect, as are the turban ranunculuses,—scarlet, crimson, and yellow.

863. For smaller beds he recommends the Scillas,—*sibirica,* blue; *bifolia,* lilac; *alba,* white; *carnea,* pink; and *præcox,* blue,—which require only a light soil and careful treatment. These, while suited for small beds, are better adapted as edgings for beds than for massing by themselves; but the bulbs should be planted, in November, where they are to flower.

864. For broad border the following arrangement of herbaceous flower-roots, in four rows, is recommended as furnishing flowers the whole length of the border from March to October:—

865. 1st Row, next the edging.—1. Red, Hepatica; 2. white, Arabis; 3. yellow, Primrose; 4. Œnothera pumila, yellow; 5. blue, Violet; 6. red, Geranium sanguineum; 7. blue, Aster alpinus; 8. red, Polyanthus; 9. white, Snowdrops; 10. yellow, Crocus; 11. blue, Gentiana acaulis; 12. white, Ornithogalum.

866. 2nd Row.—Yellow, Adonis vernalis; 2. red, Phlox; 3. white, Gypsophila prostrata; 4. blue, Gentiana septemfida; 5. yellow, Trollius asiaticus; 6. red, Phlox setacea; 7. white, Pinks; 8. blue, Campanula azurea; 9. yellow, Alyssum saxatile; 10. white, Phlox suaveolens; 11. red, Dodecatheon Meadia; 12. blue, Campanula carpatica.

867. 3rd Row.—1. Red, Pæony; 2. white, Spiræa trifoliata; 3. yellow, Coreopsis lanceolata; 4. blue, Iris graminea; 5. red, Pentstemon; 6. white, Gnaphalium; 7. yellow, Ranunculus acris flore pleno; 8. Lupinus polyphyllus; 9. red, Scarlet Lily; 10. Stipa pennata; 11. yellow, Rudbeckia hirta; 12. blue, Delphinium Borloneii.

868. 4th Row.—1. Red, Pæony; 2. blue, Campanula persicifolia; 3. yellow, Lilium tigrinum; 4. blue, Aconitum; 5. red, Double Lychnis; 6. white, Lily; 7. red, Phlox; 8. white, Galega alba; 9. yellow, Helianthus multiflorus; 10. Campanula pyramidalis; 11. Chelone barbata; 12. orange, Tritoma media.

869. In the mixed garden, as in all others, flowers in vases are admissible; and although no plant surpasses the scarlet geranium for effect, a little variety is desirable. In early spring nothing is more suitable than the *Nemophila insignis, maculata, atomaria,* and *discoidalis.* These planted in a rich light soil in the autumn will stand any ordinary winter, and their varied flowers trailing over the surface and pendent from the sides of the vase, present a very gay appearance. *Collinsia grandiflora* forms a compact tuft of flowers, and contrasts well, in colour, with the bright orange flowers of *Sphenogyne speciosa.* This should be sown in September, and nursed through the winter in a cold frame, or sheltered by matting potted in rather poor soil; being thoroughly hardened by exposure in March, plant them thickly in the vases in April. *Lupinus nanus* treated in the same way is also a beautiful plant, as is the lovely little *Clintonia pulchella* turned out of the pots in April. This little gem should be potted in September in soil rich in vegetable matter, and mixed with a little peat in a rough state, and kept from frost under a frame or elsewhere. The Clarkias also, though strong-growing plants, are very hardy, as becomes their Siberian origin, and very pretty, contrasting well with such plants as *Gilia tricolor* and *G. tricolor alba. Godetia rubicunda, Iberis cineraria,* and the lovely little *Kaulfussia amelloides,* all stand our ordinary winters, with a little protection in the dead of winter, under a frame or matting; hardening them off by full exposurse before planting. To these may be added German stocks of all colours. Double wallflowers will keep the vases gay from April to the end of June, when the fuchsias, pelargoniums, and the summer occupants of the vases, should be ready to succeed them.

THE BRASSICÆ, OR CABBAGES.

870. *The Brassicæ, or Cabbages,* are the most important product of the garden, whether we look at them as a necessary or a luxury of life. They are also, except under a well-considered system of rotation-cropping, the most exhaustive class of vegetables under the gardener's care. With such properties, it is not surprising to find that they were well known to the ancients, and that, in all probability, we are indebted to the Romans for their first cultivation in British gardens. By Theophrastus and the earlier Greek writers they are called *Raphanus,* from the seed bearing a resemblance to that of the radish. By later writers it was called *Attici,* from its supposed tendency to injure the eyes, a notion entertained at one time by Columella (*oculis inimica corambe*); but he afterwards contradicts himself, and declares it to be good for dim eyes.

871. The Roman *Brassica* comes, it is supposed, from *præsece,* because it was cut off from the stem; but a British or Celtic origin is also assigned to the name, from *Bresic.* It was also called *Caulis,* from the quality of the stalks; and hence the English word cole or colewort, the word by which all the non-cabbaging varieties of the plant are known,

872. The qualities of the cabbage seem to have been well ascertained and

appreciated by the ancients. The Greeks esteemed it, and their fables give it a divine origin in a different sense from that of the moderns; for they inform us that Jupiter, in labouring to explain two oracles which contradicted each other, perspired under his task, and from the divine perspiration the colewort sprang. The Greek authors mention three kinds of this vegetable: the crisped or ruffed, which they called Selinas, or Selenoides, from its resemblance to parsley; the second, Sea; the third, Corambe. Among the Romans it is related that that astute people, having expelled all physicians out of their territory, used the vegetable as their only medicine, and considered that for six hundred years they preserved the health of their citizens by so doing. Its universal use is testified by Columella's stanza:—

"The herb which o'er the whole terrestrial globe
Doth flourish, and a great abundance yield
To low plebeians and to haughty kings,
In winter cabbage, and green sprouts in spring."

873. "Yet pleasant and sweet as these sprouts are," says Pliny, "the exquisite palate of Apicius rejected them for the table, and his example was imitated by the equally fastidious Drusus Cæsar, who did not escape the censures of Tiberius for being so over nice."

874. The Romans seem to have had three distinct kinds of cabbage.—I. A plant with leaves wide-open and a large stalk. II. With crisped leaves, called "Apiaca." III. With smooth tender leaf. But as to varieties they would have been no unworthy rivals of Battersea or Fulham in our day. They had the Tritian, the Cumanian, the Aricinian, the Pompeian, and the Sabine cabbages; and lastly came into fashion the cabbage known as the "Lacuturres," grown in the vale of Aricia, having a very large head and innumerable leaves, some round and smooth, others long and sinewy,—the turnip-cabbage, or *B. oleracea gangyloides*, of Linnæus. The Apicinian mode of preparing the cabbage was by steeping it in oil and salt before boiling.

875. The ancients were fully persuaded that there was a sympathy in plants as in animals. "The vine," says one of their authors, "by a secret antipathy in nature, especially avoids the cabbage if it has room to decline from it; but in case it cannot shift away, it dies for very grief." Pliny says "the colewort and the vine have so mortal a hatred to each other, that if a vine stand near a colewort, it will be sensibly perceived that the vine shrinks away from it; and yet this wort, which causes the vine thus to retire, if it chance to grow near erigan, marjoram, or cyclamen sowbread, will soon wither and die in its turn." The cause is evident; for where two plants are together that require the same juices to support them, the weaker must give way to the one that has the greater power to absorb the nutritious moisture.

876. Numerous are the medicinal virtues ascribed by Pliny to the cabbage. It is good for the eyes, for headache, for the spleen, for the stomach; for wounds, either recent or of long standing; and "if you wash little children in the urine of a person who has been living on cabbage," says Cato, "they will never be weak and puny."

877. Among the Greeks it was considered astringent as well as aperient: it prevented drunkenness; it was beneficial to the stomach, and bracing to the sinews; in fact, there were few of the ills which flesh is heir to, for which, in ancient estimation, the cabbage, in some form or other, was not a remedy.

878. Gerarde is the oldest English author who has written on this useful vegetable: he mentions the white-cabbage cole, red-cabbage cole, the curled garden cole; the Savoie cole is, he says, numbered among the headed coleworts or cabbages. He notices the curled Savoy, but says, "the swollen colewort of all others is the strangest, and which I received from a worshipful merchant of London, Master Nicholas Lete, who brought the seed out of France, who is greatly in love with rare and fair flowers, and plants, for which he doth carefully send into Syria, having a servant there, at Alepo, and in many other countries; for the which myself and likewise the whole lande are much bound unto him." The same author says, "Rape cole is another variety; they were called in Latin, *caulo-rapum* and *rapo-caulis*, participating of two plants—the coleworts and turnips; from whence they derive their name. They grow in Italy, Spain, and some places in Germany. They must," he says, "be carefully set and sown, as musk-melons and cucumbers." This variety has now become one of our hardiest field plants.

879. The principal cabbages now cultivated in this country are, the early Battersea, early dwarf, early York, imperial Penton, sugarloaf, drumhead, red Dutch, purple turnip, Savoy, green Savoy, and yellow Savoy; and the numberless varieties which have sprung from them.

880. *Cauliflower* (*Brassica oleracea Botrytis*).—This plant was first called cole florie, and colieflorie, and is said to be derived from *caulis*, a stalk, and *fero*, to bear. Pierre Pompes says, cauliflower "comes to us in Paris by way of Marseilles, from the isle of Cyprus, which is the only place I know of where it seeds." From this account it would appear that cauliflowers were not much cultivated in France in 1694, when his work was published.

881. *Broccoli* (*B. o. Botrytis cymosa*).—This plant is said to be an accidental mixture of the common cabbage and the cauliflower; it is also said that it grows in no part of the world to such perfection as at Portsmouth. Our varieties are the Cape, early purple, late purple, early white, late white, and the Siberian.

882. *Seakale* (*Corambe maritima*).—Kale, or, according to our oldest writers, sea-colewort, is indigenous to our southern shores. Gerarde observes in his Herbal, that "the sea-colewort groweth naturally upon the bayche and brimmes of the sea, where there is no earth to be seen, but sand and rolling pebble-stones. I found it growing between Whystable and the Isle of Thanet, neere the brincke of the sea, and in many places neere to Colchester and elsewhere by the seaside." It does not appear that the Romans had attempted to raise this vegetable in their gardens in the time of Pliny, who calls it *Halmyridia*, and says it grows wild on the sea-coast. He observes, provision is made of them to serve in long voyages at sea, for as soon as they

are cut up they are put into barrels where oil has lately been kept, and then stopped up close, that no air can come to them.

883. This important family of vegetables are biennial, triennial, and nearly perennial in some of the varieties. They may be divided into—

1. The cabbages proper, which have heads formed of the inner leaves growing close and compactly round the stem, which are thus blanched into a whitish yellow by the outer leaves.
2. Red, or Milan cabbage, which grows in the same form, except in colour.
3. Savoys, distinguished by their curly wrinkled leaves, but retaining the tendency to form a head.
4. Brussels sprouts, producing the sprouts, or edible part, from the stem in small heads, like very young cabbages.
5. Borecole, of which there are many varieties, has a large open head with large curling leaves.
6. Cauliflower and broccoli, in which the flower-buds form a close fleshy head of a delicate yellowish-white, for which both are cultivated.

884. Of the first of these there are many varieties, some of them valuable for their precocity, which adapts them for early spring cultivation ; others for more enduring qualities. They are all propagated by seed sown for main crops twice a year,—namely, in April, for planting out in June and July, for autumn and winter use ; and in August and September, for spring use ; but it is usual to make sowings of smaller quantities every month for succession.

885. The Romans propagated the Brassica by seeds and cuttings, by which choice varieties may be perpetuated with greater certainty than from seed. This is done by slipping off the sprouts, which all the tribe produce on the stem, when about four inches long ; and after exposing it to the air for a day or two to cauterize the wound, it is dipped in caustic lime, and planted where it is to grow. Pliny tells us they are fittest for planting or for eating when the sprout has six leaves.

886. *The Cabbage.*—The seed is sown on beds four feet wide, and long in proportion to the sowing, — a bed 4 feet by 20 will take 2 oz. of seed. Cover the seed to an eighth or a quarter of an inch with rich light soil, and rake it in : the after-cultivation will be gathered from the calendars. They require a rich retentive soil. The whole tribe are improved by early transplanting when about two inches in height. The young plants should be removed into nursery-beds thoroughly prepared by digging and manuring, and, if dry, by watering, where they are planted four or five inches apart. Here the plants remain till well rooted. Their next remove is usually to the place where they are permanently to grow ; but they will be rather improved than otherwise by an intermediate shift to a second nursery-bed.

887. In final planting out, the ground being trenched and well manured, a drill is drawn, three inches deep, at a distance proportioned to the size and habit of growth of the variety ; the small or early dwarfs at 12 or 15 inches apart in the rows, the larger sorts, as Vanack, at 18 inches.

The subsequent culture is confined to weeding and occasionally stirring the earth during summer, and drawing it up round the stem when about eight or nine inches high.

888. The best varieties of the white cabbage are the Early York, Early Battersea, Early Dwarf Sugar-loaf, the Late Sugar-loaf, Vanack, the Portugal, or *Couve Trunchuda*,—of all of which there are many varieties; as Atkin's Matchless, Sutton's Dwarf Combe, Sutton's Imperial, Enfield Market, Shilling's Queen. The conical Pomeranian is singularly hardy and very compact. The Vanack was subjected to experiment by the Horticultural Society, and Mr. George Lindley reported it as "always in season by timely sowings, making excellent spring coleworts; becomes white-hearted cabbage very early, and furnishes fine sprouts after the cabbage is cut." The red cabbage is chiefly used for pickling, and the varieties are confined to the Dutch, Aberdeen, and Dwarf Red. Their cultivation is in all respects the same as the white cabbage, and the vegetable is only gathered when the head is thoroughly formed, and when so gathered the stem is thrown away as of no further value.

889. *The Savoy* has been in cultivation in this country since the times of Gerarde, by whom it is described. It is distinguished by its curly leaves and deep green colour from the cabbage; like it, however, it grows a compact well-shaped head, and a plentiful crop of sprouts on the stem during winter. Like the others, it is propagated by seeds and cuttings in the spring, sown on a hotbed in February, or on beds in the open ground early in April. Plants will be ready for planting out permanently in May, June, and July.

890. In all respects the treatment is the same as with cabbages, removing the plants to a nursery-bed when two inches high, selecting the strongest plants first. When planted out permanently, they should stand two feet apart in the rows and 20 inches between the plants; but it is not unusual to plant them between standing crops of peas or other less permanent crops, whose place they thus occupy when removed.

891. *Brussels Sprouts* have the same treatment in the seed-beds; early in April being the best time for sowing in the open ground. Mr. Cuthill thinks March sowing would be better. "When thus sown," he adds, "I have had them three feet high, each stem producing a peck of large close sprouts." The after-treatment Mr. Cuthill recommends, is to "select a rich stiff loam, and plant them in rows 2 feet or 18 inches apart, keeping the ground loosened by hoeing; and as soon as the stems reach their full height, which is known by the top beginning to cabbage, it is cut. This throws all the strength of the plant into the sprouts on the stem, and makes the bottom ones as good as the top." Mr. McIntosh dissents from this practice of cutting the top: "From their form and position," he says, "they protect the sprouts during winter, and in wet weather, from frost, snow, and rain."

892. *Borecole, Greens, and Curlies*, are a numerous tribe of the Brassicæ, cultivated for their leaves in winter and for their sprouts in the spring. The first week in April or May, and again about the second week in August, is the

time to sow, using exactly the same precautions as with the others. The borecoles are less exhausting to the soil than the cabbages, and will follow peas without fresh manuring, if the ground is in tolerably good heart; or they may be planted between rows of peas or potatoes, to occupy the ground when these crops are removed.

893. The Horticultural Society have experimented on this tribe of *Brassica*, and issued a report; but the varieties are so numerous and so mixed, that the distinction between them is still very indefinite. *Dwarf Curled Greens*, under half a dozen names, are the old Scotch curly, very dwarf in habit, and closely curled,—an excellent variety. *The Tall Green Curled*, also under a host of names, grows two or three feet high, stands severe frosts, and affords the most delicate greens when frosted. *Purple Borecole* differs little from the preceding except in colour. Variegated borecole is a mere variety, very useful, and even ornamental, in the mixed garden.

894. *The Cottager's Kale* is a variety of the tall cavalier cabbage which was raised at Sherburn Castle, Oxfordshire, from Brussels sprouts. Crossed with one of the varieties of kale, it was submitted to the Horticultural Society in the spring of 1858, and is said to be the most tender of all the greens, and of exquisite flavour. It stands four feet high when full-grown, and should be allowed an equal space to grow in, being clothed to the ground with immense rosette-like shoots of a bluish-green tint, which, when boiled, become a delicate green. The seed should be sown late in March or early in April, and when planted out, should have a rich deep soil assigned to it.

895. The cabbage, partially analyzed by Schræder, contains 0·65 green feculous matter, 0·29 vegetable albumen, 0·05 resinous substance, 2·89 gummy extract, 2·84 extractive soluble in water and in alcohol; besides a sap containing sulphate of nitre and of the chlorate of potash, and phosphate of calcium and magnesia, with oxide of iron and manganese. Other analyses have demonstrated that sulphur is present, besides an animal principle more abundant than in any other cruciferous plant. An analysis by Fromberg gives as follows:—

Nitrogenous or nutritive matter	1·75
Heat-giving do.	4·05
Mineral matter	0·80
Water	93·40
	100·00

896. There is no doubt of their being antiscorbutic, and, as French writers say, preventives of gout: the first water from it is laxative; the last mildly astringent. The tender leaves have been administered in leprosy. The seed has been recommended as a cure for worms. In confirmed pulmonary diseases, a syrup in which the sap of the red cabbage occurs, is sometimes administered by French physicians to soothe the patient. The white cabbage, in a fermented state, is very extensively used throughout Germany, under the name of sour-krout. In the navy and in sea-going ships it is used as an anti-

scorbutic. Hahnemann, the originator of homœopathy, prescribes it in some of his remedies.

897. Our English physicians consider cabbages in general as hard of digestion, and apt to produce flatulency in weak stomachs. It is, however, a wholesome diet for those who have good digestion, when used immediately after cutting.

898. *Cauliflower* (*Brassica oleracea Botrytis*).—In the preceding varieties of the *Brassicæ,* we find them cultivated for their leaves, growing either loosely on the stem, or forming a round compact head, blanched by being covered with the outer leaves, or sprouting from the stem, sometimes in small heads, at others in separate small slender leaves. We now come to the cauliflower, in which the abortive flowers form a serried corymb, connected with the stem by a thick fleshy peduncle, the whole thickly interwoven, and forming a compact round head of a creamy-white colour, and of great delicacy when properly grown.

899. The origin of the cauliflower, like all the family, is ascribed to the common wild cabbage, *B. oleracea ;* but it requires considerable faith in the tendency of the plant to sport into varieties, in order to believe them to be of the same species. It is of eastern origin, having been brought from Cyprus into France, and introduced from that country into England early in the 17th century.

900. With us the plant is treated as an annual, although it may, like all the race, be propagated from cuttings. In order to keep up a succession, three or four sowings should be made in the season, the first sowing being made on a slight hotbed in February, or very early in March. This is done by digging away a few inches of the soil the size of the intended bed, filling it up to a few inches above the surrounding soil with fresh stable-dung which has been well turned, covering the bed with the soil removed, raking it, and patting it smooth with the back of the spade. On this bed sow the seed, raking it in, or sifting fine soil over it, and covering it with hand-glasses, and otherwise protecting it when necessary.

901. Early in April a second and larger sowing should be made in the open ground, and a third and last sowing about the middle of August, to stand through the winter. These sowings are made on beds of rich light soil, thoroughly pulverized by digging, and neither too dry nor too moist, 4½ feet wide, and long in proportion to the requirements of the garden, half an ounce of seed being sufficient for a 10-foot bed. In very dry weather, the seed-beds should receive a copious watering the night before sowing. When the plants are large enough to be handled, transplant them to nursery-beds of rich soil, well manured, pricking them out four inches apart each way. Some authorities recommend a second removal when the roots have formed a compact mass, in order to check the growth of stem and promote balling. In June the April sowings will be fit to plant out where they are to grow ; in September they will be heading, and will continue to improve up to the frosts of early winter.

902. Like all the Brassicas, the cauliflower requires a rich deep soil and an

open spot, but sheltered from the north. An old celery or asparagus-bed, from which the plants have been lifted for forcing, is excellent: if none such is at liberty, let the ground be well trenched, three feet deep, and manured with good rotten dung, thoroughly incorporated with the soil in digging, bearing in mind that the delicacy and freshness of the vegetable depend on its rapid and vigorous growth when once started. On the ground thus prepared plant the young seedlings 2½ feet apart each way.

903. The after-cultivation is very simple; careful weeding, stirring the soil from time to time with the hoe, and drawing the earth about their roots, and copious watering at the roots in dry weather, include the necessary routine.

904. The autumn-sown plants are usually pricked out under frames for protection during winter, keeping them clear of weeds and decaying leaves, stirring the soil occasionally, and giving plenty of air in fine weather, protecting them from frost and rain. As they advance, and begin to head under hand or bell-glasses, every opportunity should be taken of giving air: in severe weather, protect the frames and hand-glasses by packing litter round them.

905. When the heads begin to appear, shade them from sun and rain by breaking down some of the larger leaves, so as to cover it. Water in dry weather, previously forming the earth into a basin round the stem, and pour the water into the roots, choosing the evening in mild weather for so doing, and the morning when the air is frosty.

906. Mr. Henry Baily, of Nuneham Park, a well-known authority, transplants his autumn seedlings, as soon as they have made a few roots, into 60-sized pots, which he places in an open airy frame, or other sheltered place having facilities for protecting them from frost. As they fill the smaller pots with their roots, they are transplanted into larger ones, taking care that the roots never get matted in their pots; and early in February the first crop is placed out on a south border, the holes prepared for them having received a barrowful of thoroughly rotted dung, over which the mould is replaced, forming a little hillock on which the cauliflowers are planted. They are covered with the hand-glass till thoroughly established. By pursuing this course, Mr. Baily tells us (Hort. Trans. v. 103), all check on the vigorous growth of the plant is avoided, while the tendency to increased luxuriance so necessary in plants whose leaves or flowers are eaten, is encouraged.

907. After planting out, copious waterings should be given in the mornings in dull, cloudy weather, or in the evenings after bright sunshine.

908. On the approach of winter, the plants in flower may be taken up with as much earth at their roots as possible, and planted, or rather laid in by the roots, and lying on their sides, in a light sandy soil, in some warm, sheltered place, where the frost can be excluded. In such a shed or frame they may be kept fresh and in condition for many weeks. Mr. Drummond, of the Cork Botanic Gardens, dug pits in the common soil, planting the cauliflowers in it, and covering them with frames of long wheat straw, tied together in small bundles, as directed for reeds in par. 718, giving them air in fine weather.

909. The increase of so-called varieties led the Horticultural Society to test their qualities a few years ago, with the following results :—Eight kinds were sown on April 9, and subsequently treated alike in every respect. Of the eight kinds tried, the large Asiatic and the Walcheren proved to be the most deserving of cultivation. It must here be remarked, however, that April 9 is much too late to prove some cauliflowers in this country; for every gardener knows that a kind which comes good in spring may be almost worthless in a dry hot summer. The early varieties were failures, but the late kinds were good. In experiments upon vegetables, it is important that they should be proved in the best season for their particular growth, as many are trained to early spring, others to summer, and others again to autumn growth; and there is little doubt that these properties, within certain limits, become hereditary.

910. *Broccoli* is supposed to be a variety of the cauliflower; and certainly, if we admit all the other *Brassicæ* to be varieties of the wild *B. oleracea*, this relationship may be readily admitted. It differs very slightly indeed from the cauliflower. The flower-stem is longer and less fleshy, the head less compact, and it rarely attains the size or delicacy of the cauliflower. It is of very recent introduction, and Miller mentions the fact of the white and purple broccoli coming from Italy in his time. In many respects the culture of the broccoli is the same as the other cabbages. From the middle of April to the middle of May, according to the season and locality, it is sown in beds, or, as some recommend, in the ground where it is to grow, first trenching and treading it thoroughly, and inserting the seeds in rows two feet apart from each other, dropping two or three seeds into each hole. In order to prevent early and partial flowering, where this mode of culture is adopted, all but the strongest plant are drawn, when the seeds come up, and either thrown away or transplanted. Where seed-beds are adopted, they should be prepared of rich light mould, well dug, and, if very dry, well watered the evening before sowing. The seeds should be thinly sown, and the beds covered with mats or litter till the plants appear. When the plants are about two inches high, prick them out into nursery-beds four inches apart, watering them in dry weather. In a fortnight or three weeks they will be strong enough for planting out, the ground for them having been prepared by trenching and manuring.

911. Broccoli succeeds best in fresh loamy soil; therefore, where that cannot be given, deep trenching, by which fresh earth is brought up nearer the surface, is the next best soil for it, adding plenty of manure. According to the size of the plant, they should be planted 18 inches to 3 feet asunder. Knight's dwarf only require 18 inches; early white, 27 inches; purple Cape, Walcheren, and early white, 2 feet asunder; and the taller sorts, as large-headed purple, cream-coloured, and cauliflower broccoli, 3 feet apart.

912. During its summer growth the ground requires to be deeply stirred between the rows, to keep up the action of the air and moisture about the roots.

913. *Hints on Sowing Seeds.*—There are two points in connection with seed-

sowing which are of paramount importance to the success and vigour of germination, and the regularity, strength, and luxuriance of the crop, besides that of having good and perfect seed. These are the proper mechanical condition of the soil, and the regular and uniform depth at which the seed is sown. The presence of air, moisture, and a certain degree of warmth, is essential to the germination of seeds. In the absence of these agents, the process of germination will not go on. The soil is the medium by means of which a supply of air, moisture, and warmth is kept up; but, unless the soil be in a proper condition, it cannot supply these. If it be very dry, it contains too much air and too little moisture. The proper condition of the soil is when it is neither very dry nor very wet; it is then moist, but not wet; it has the appearance of having been watered, and is easily crumbled to pieces in the hand, with its particles adhering together.

914. A state of too much dryness seldom occurs in this country; but the presence of too much water is not uncommon; it is, however, remedied by drainage. The grand point is to get the soil thoroughly well pulverized, by means of which, with proper drainage, it will be in a condition favourable to germination of seeds. Temperature exercises a powerful influence over the time required for germination, and, within certain limits, the higher the temperature is, the more rapidly does germination go on. The soil receives its heat through the medium of the air; consequently the surface-soil is more quickly heated than that lower down. Whenever the air is warmer than the soil, the surface will be warmer than that below; when, on the other hand, the air is cooler, the surface will, by contact, cool much more rapidly than that below the surface. From this it follows, the more rapid germination will occur at about one inch below the surface, to which depth the heat will soon penetrate, and which, nevertheless, will not be so readily cooled during the night. Seeds on the surface will generally grow most rapidly, and the germination of others will occupy more time as the distance from the surface is increased. It is owing to this fact that seeds too deeply sown do not grow at all, the temperature not being sufficiently elevated, and the supply of air being too limited to set the chemical process at work, which is essential to germination. M. S.

§ 4.—The Fruit-Garden.

915. Planting of all kinds, except in cases of absolute necessity, should now be over for the season. Should it still be necessary to plant, precautions should be taken to protect the tender roots, while they are yet foreign to the soil, both from frost and heat, by mulching with long stable manure, or, as some recommend, by laying a layer of pebbles over them, laid on a bed of sand, and covering that, during the spring months, with ferns, haulm, or other attainable rubbish. All winter pruning will now be completed. Peaches and nectarines are advancing towards blossom, and apricots, on a south wall, will be showing their bloom. These now require the greatest attention. If the

autumn and winter months have been wet and cloudy, the fruit-bearing branches will be weak and watery. Every protection from spring frost should be given to the tree under these circumstances. In such seasons, especially in the months of August and September, the young shoots being unripened in the previous autumn, the trees are subject to the ravages of the green-fly. If not observed at once, they commit very serious damage. Tobacco-water, in the proportion of 2 oz. of tobacco infused in a quart of boiling water, is a remedy as well as a protection, when applied cool to the tree with a brush. A weaker decoction may be applied with the syringe with advantage.

916. The question of protection is one on which the authorities are by no means agreed; but Mr. McIntosh and some of the best gardeners recommend temporary projecting copings to the walls, and canvas or calico curtains depending from them. Others find a worsted netting of small mesh and thickish thread a sufficient protection, while it leaves a freer play to the natural atmosphere round the trees; and many good authorities favour this view. Another object of protection in the early spring is to retard the blossoms by shading from the sun. For this purpose canvas, suspended before them during the heat of the day, is the most efficient.

917. The perfect-bearing shoots of the peach and nectarine are known by their buds towards the base of the shoots. Some of these are pointed, single buds, with a brownish envelope: these are leaf-buds. Next to these, and higher up the shoot, are triple buds,—a plump, silver-coated one on each side, and a thin one in the centre. This central one is a leaf-bud, the outer two are blossom-buds; and it should be the aim of the pruner to cultivate as many of these as possible.

918. *Apples and Pears,* which bear their fruit on spurs, when cultivated in gardens, are usually trained as espaliers, as pyramids, or dwarf bushes. We have already described the training and pruning these trees undergo. In the mature state they require care in selecting the shoots to be retained, preferring ripe, short-jointed, brownish shoots, shortening back these to a bud which will extend the growth of the tree, studying,—first, the production of spurs; second, to keep the heart of the tree open; third, as the finest fruit is borne on the extremities of the branches, to keep these within as compact a range as possible.

919. *Vines* are now pushing forth their young shoots in great numbers. At this season only those which are obviously useless, and especially those issuing from old wood, unless wanted for future years' rods, should be rubbed off with the finger and thumb close to the stem. The useless ones being disposed of, those left should be trained close to the wall, at regular distances apart, so that all may enjoy the light, heat, and air.

920. *Strawberries,* which have been under mulch all the winter, should now be uncovered; the old foliage would be cut down in March, as directed; and after clearing away all weeds and useless runners, a spring dressing of half-decayed material from the cucumber-frame, mixed with soot and decayed leaves, will be useful, watering frequently towards the end of the month.

921. *Gooseberries and Currants,* pruned in January and top-dressed in March, by removing an inch or two of soil and replacing with a compost of loam and decayed dung, in equal proportions, extending to the extremity of the roots, will now require little attention till the fruit begins to form.

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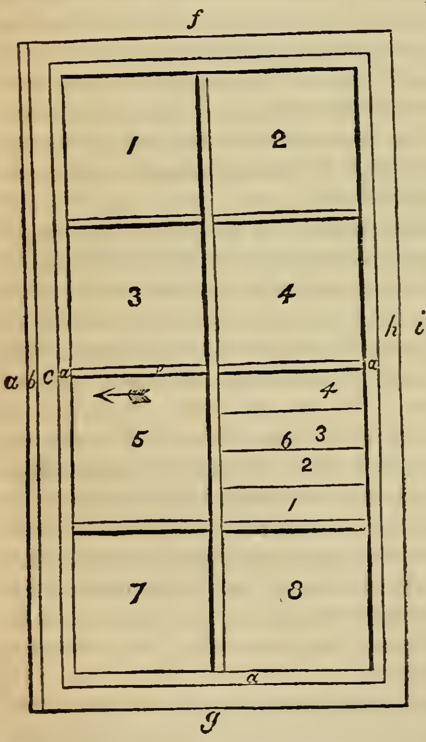
§ 5.—OPERATIONS IN THE KITCHEN-GARDEN.



922. Supposing the accompanying diagram to represent an acre of ground, the length to run east and west, which gives the advantage of a good peach wall, *a—b* is the line beyond which it is not advisable to crop; *c* is a border 12 feet wide, which may be devoted to early crops, or espaliers, pillar, or bush fruits. The same may be said of the borders *f* and *g*. The east and west walls may be trained with plums, cherries, pears, mulberries, walnuts, medlars, or other trees: *i* is supposed to be a low wall, fence, or hedge; *h*, a border, where late fruits or salading may be grown during the summer time, when a little shade is an advantage to them; *d*, main walk, six feet wide, running round the quarters; *e*, cross-walks, four feet wide between them. The main body of the kitchen-garden is divided into eight squares, two of which are devoted to each group. Let *c* be planted with,—1. asparagus, 2. globe artichokes, 3. seakale, and 4. rhubarb. Of course the space for each will be determined by the requirements of the family; but the proportions indicated may serve as a guide. Let 5 be planted with bush-fruits, as currants,—including red, white, and black, gooseberries, and raspberries, and, it may be, root-pruned trees. Horseradish may be planted between these. To keep all these in proper condition, a few of each should be removed every year,—the asparagus, seakale, and rhubarb for forcing: the artichokes can be separated for propagation; and the raspberries divided and replanted. 7 and 8 are supposed to be planted with preparers, which comprise beet, celery, carrots, turnips, leeks, onions, peas, scorzoneras, salsafy, beans, cardoons, Jerusalem artichokes, potatoes, parsnips, scarlet-runners: these are some of the principal kitchen-crops, and comprise about one-fourth. Then, again, let 1 and 2 be devoted

to surface-crops, which, for the sake of equalizing them with the other groups, will comprise numerous light crops,—as salads, sweet herbs, and similar crops; the exhausters, comprising another fourth of the whole,—broccoli, cabbage, including Dutch, red Braganza, &c.; Savoys, Brussels sprouts, cauliflower, kale, or borecole. These will occupy 3 and 4. As these two squares become vacated, the deepeners may fill the space left by them, until, in course of time, 3 and 4 become filled with the latter. The exhausters will have taken the place of the surface-crops on 1 and 2; the latter will be transferred to 7 and 8, previously occupied with preparers, which have followed the deepeners on 5 and 6; and thus a perpetual rotation may be maintained, which will improve the ground instead of impoverishing it.

923. *Asparagus.*—This crop is usually grown on beds, but there is no advantage whatever in marking the ground into beds; the most approved method is to trench the ground three feet deep, turning in a heavy dressing of manure. Supposing this is done in the depth of winter, let it lay rough till April, when it will be pulverized by frost; then lay on it a good coat of very rotten dung, and fork it well in, making the ground level; then plant the roots in rows two feet apart, and 8 or 10 inches apart in the rows. The mode I prefer is to have two-year-old plants, and, having stretched a line north and south, to cut a drill with a spade 8 or 10 inches deep; in this place the roots, the crowns two inches below the surface, and close the earth about them with the hand, and settle them well in with water, not poured on them from a spout, but from a coarse rose. In two years' time it is fit to cut; and if two or three rows are taken up and forced, and a like quantity planted every year, there will always be a supply in all stages, the main body being strong and vigorous roots to cut from; and none are better for forcing than such as have served five or six years in the open ground. To raise asparagus from seed, which it yields in abundance, if allowed, in the autumn, the seed should be gathered when fully ripe, hung up to dry, and rubbed out when sufficiently so. It may be sown thinly on ground that has been well dug, but not manured, any time from the beginning of March to June: if sown broadcast, it should be scattered thinly and evenly, and trodden in, and the ground raked over; if in drills, they should be about a foot apart and an inch deep, the seeds sown thinly, and pressed and raked over. They make more root than top the first year; but if they are kept clear of weeds, and the ground stirred often between them, they will grow vigorously the second year, and be fit to plant out the following spring.

924. *Celery* may be sown at this time for a late supply. Sow in an open piece of ground, as between newly-planted or sown asparagus or artichokes: such spaces do well for the purpose; and as they are to be pricked out as soon as large enough to handle, they will draw the ground but little. The seed should be scattered very thinly, trodden, and raked even, and, if necessary, watered. It should, when large enough, be pricked out about six inches apart, on an open well-manured piece of ground. When ready to plant for good in the trenches, mark out the ground into four feet clear spaces between the

trenches, allowing 15 inches for the trench, if single rows, and 20 inches, if double rows, are to be planted. Have not less than four feet clear space between the rows; dig out the trenches one spade deep, throwing the soil on the spaces between; then dig in the trenches a good dressing of rotten dung. If the weather is hot and dry, it is as well to wait for a shower of rain, unless it can be copiously watered both before and after planting. If in single rows, it is merely necessary to plant along the centre of the trench, a foot apart; if double, stretch a line along the centre and plant a row on each side of it. Let them be taken up and planted with a trowel, and not with a dibber: they should be well settled in with water. It is sometimes planted in this manner:—The ground is marked into one or more beds four feet wide; if more than one, five or six feet is left between the beds; the soil is dug out to the depth of 10 inches or a foot, and thrown on the intervening spaces; a good dressing of manure is then forked into each bed; the plants are then planted in rows across the beds five plants in each row, the rows 15 inches apart. The only advantage of this plan is, that a greater number of plants can be grown on a given space. In earthing them up, it is necessary to have two pieces of board as long as the bed is wide. Place these between two rows, letting the boards rest close to the plants: this forms a trough into which the earth is to be thrown. Before earthing up, as it is called, it is always best to gather up each plant with the hand and press the soil about it, to keep the leaves together, which prevents the soil falling into the heart of the plant. Never earth up till about three weeks or a month before it is wanted,—before the month of October, when a little more time must be allowed for blanching. Early in November the final earthing-up should be done, unless in wet soils, when it might be protected with litter and earthed up for blanching at discretion, otherwise sharp frosts might injure it. Some place dried leaves about the plants before earthing up, and others, at the final earthing, cover the plants completely over; but whether any advantage is derived from these practices may be doubted. It is advisable to dust well with lime before earthing or watering with lime-water to destroy slugs. It is always best to earth up gradually, that is, about four inches at a time, lest a too sudden change from exposure might rot the stalks. While growing, plenty of water should be given, and sometimes liquid manure; for it is a gross-feeding crop, and must be kept growing, or it will neither be crisp nor of good flavour. The best way to grow celery is to plant about 15 or 18 inches apart, on a well-manured and well-pulverized piece of ground: let it grow to its full size, keep the ground well stirred between, give liquid manure or lay rotted dung between, and water in dry weather.

925. When it is desired to blanch it, get a number of 4-inch drain-pipes, about 18 inches long; place one over each plant, hold the leaves and stalks together, and fill up with sand: it will blanch clean, and is easily taken up. A great many more may thus be grown on a given space, the waste of room between the trenches, as in the ordinary method, being unnecessary. To protect from frost, place litter between; but very sharp frosts alone will

injure them. The cost of pipes will be saved in the reduction of the necessary labour. The sand may be collected and used again, or it will be an excellent dressing for the ground, if heavy. For sorts, I have found none to surpass Colour Red and Crystal White, which, if well grown, are all that can be desired.

926. In the suburbs of large towns, where ground is valuable and space limited, it often happens that kitchen-gardens are severely overtasked, through a prevailing notion that high tillage and abundant manuring make up for extent of room. This is true ; but it has its limits ; for instances are not wanting to show that serious and vexatious results are traceable to this cause. The ground gets filled with insects,—undecomposed manure is worked into the soil after each crop,—it is trenched in, dug in, or laid on the surface as mulch sometimes ; all manner of undecomposed rubbish and garden refuse is trenched three or four feet deep. The result is obvious ; for where there is decomposition, or putrid fermentation takes place, many agencies are attracted thither to hasten the work ;—insects are bred in vast numbers,—club and canker become prevalent, and good gardening becomes impossible. The remedy for this state of things is either a copious manuring with unslaked lime, burning the soil, as described at page 46, or the substitution of new soil, if the surface-parings of a pasture are conveniently attainable. But prevention is always better than cure. The manure should be thoroughly decomposed or rotted, so that it is not likely to breed insects, and before it is applied to the ground, it should be well incorporated with an equal quantity of loamy soil. Where ground is heavily worked, as, for instance, where a spring crop of lettuces, an autumn crop of potatoes, and a winter crop of greens have been obtained from the same piece of ground, manure alone will not supply the whole of the loss ; but the addition of new soil may do so. Another mode of prevention is to adopt a well-defined system of rotation : such measures will keep the ground in good heart.

927. *Rhubarb* may be forced in the same way. The best I find for forcing is the Prince Albert or Linnæan, which force with less heat than most other kinds. If forced on the ground where it grows, nothing more is required than to cover with large pots and stable manure,—by this method it is blanched ; but when forced in a frame, or otherwise, it is unnecessary to exclude the light, as there is no advantage in blanching it. Rhubarb may be planted at any time of the year, although mild weather in autumn or early spring is best : it should be planted on a clear open spot on good soil, which should be well trenched three feet deep. The plants should be not less than four feet apart ; or, where it is intended to take up some every year for forcing, a distance of three feet will be sufficient. Before planting, a good substance of very rotten manure should be worked into the soil. When desired to increase the plants, it is merely necessary to take up large roots and divide them with a spade ; every piece that has a crown to it will grow and make a plant ; and as it grows very quickly, this is as good a mode of propagating it as any.

928. *Jerusalem Artichokes* may still be planted where not previously done.

Give four feet one way, and three or four feet the other. It should not be delayed after the first week this month.

929. *Globe Artichokes.*—The best method of propagating these is to take offsets from them in April or May, and plant them, three feet apart, in a row, and the rows five feet apart. They bear little or nothing the same season, but produce abundantly the following. To keep them in good bearing condition, it is advisable to plant a fresh row every year, and remove one of the old ones. If they are protected with straw, fern, or leaves, in winter, they bear rather earlier in summer; but many leave them unprotected. They are then killed to the ground, but break up strong in the spring. Before planting them, the soil should be trenched three feet deep. The foregoing are all of the same group, that is, deepeners, and the same rules hold good for their culture; *i. e.* the ground should be deeply trenched and well manured, except in the case of horseradish; and as it is advisable to give other crops the benefit of ground vacated by them, it is as well to adopt the afore-mentioned rule,—to plant fresh rows of them every year and remove some of the old, either for use or forcing.

930. *Horseradish* should be grown on an open spot. It is a mistake to suppose this crop can be stowed away in any corner or out-of-the-way place; it requires high culture to produce it good, and it repays good treatment as well as any crop. My mode of culture is to trench the ground three feet, but to be rather sparing of manure, as this produces a tendency to fork: the ground should be well broken any time during the winter. I take up some old roots, trim them for the kitchen, cutting off the crowns about an inch and a half long,—these latter are for planting; I then with a dibber, which is marked two feet from the lower end (that being the depth they are to be planted), make the holes two feet apart in the rows, and the rows three feet apart; then with a lath-stick split at one end, the crown is inserted in the slit, thrust down to the bottom of the hole, and pushed out by another stick, which is thrust down for the purpose. I never fill up the holes, which I think is unnecessary, as they gradually fill as the horseradish nears the surface. If a fresh row is planted every year, and another taken up, the crop will be kept in condition, and a fresh piece of improved ground offered every year for other crops.

931. *Parsley, Chervil, &c.* should be sown for the purpose of keeping a stock of young plants to gather from, as young leaves are best.

932. *Spinach* may still be sown, and is often useful for colouring green pea-soup in the summer. Sow in a shady spot if possible: it will last longer.

933. *Potatoes* for the main crop to be got-in this month. As the ground is more likely to be dry at this time, they may be dibbed in whole, thus yielding food for the young shoot till it can find its own,—a most reasonable assumption, and worthy of adoption. When potatoes are cut, it is best to expose them for a day or two, to render the surface of the cut callous. In planting them, let it be in rows two feet apart; or, if space is limited, allow three feet, which admits of planting later crops between, before they are taken up. Although little is gained by allowing too much room, much is lost by

allowing too little; for root-crops are apt to run all to haulm or top if too crowded. Two feet from row to row, and 15 inches from plant to plant, is a good average. If the ground is light or dry, they may be dibbed in; that is, a line is stretched where the row is to be, on one side of which the holes are made with a potato-dibber—this is a pole or shaft three feet long, having a cross-piece of wood on the top for the handle, and a treddle for the foot eight inches from the lower end, and of sufficient thickness to make a hole that a potato may drop in easily. A potato or set is dropped in each hole, and filled up by drawing a wooden rake over them; but it is objected to this, that the pressure of the dibber hardens the soil all round, and checks the spreading of the young tubers; making drills with a spade, and planting that way, is therefore preferable; or they may be planted as the ground is dug, merely placing a line, cutting the drill, placing the potatoes 15 inches apart, then digging backward two feet, placing the line, cutting another drill, and so on.

934. If the ground is wet, heavy, or, indeed, under any circumstances, a good plan is to cut a drill with the spade six or eight inches deep. In this place the sets 15 inches apart, then move the line to the next row, cut another drill in the same manner, but fill up the preceding drill with the soil taken out, covering the sets in it. This is an expeditious mode, and will do on any soil. On stiff soils the dibber should never be used, because it forms a basin in which water is likely to stand and rot the potato. About the end of March or beginning of April the main crop may be planted, or it may be deferred till quite the end of the latter month, and smaller plantings may be made till midsummer. When they have grown about eight or ten inches high, a little earth should be drawn up to them—just sufficient to cover any tubers that may grow near the surface; but too much produces luxuriance of growth in the haulm, and is contrary to nature. The ground should be thoroughly drained. It is generally admitted that the disease is most prevalent in wet soils, or wet seasons. Some recommend cutting off the haulm as soon as the blight appears: this may save them in a great measure from the rot, but stops the growth of the tubers, and whether any real advantage is derived from it is still undecided. It is advisable to pick off all the flowers, unless seed is wanted, as doing so will throw the strength of the plant into the process of forming tubers. As to sorts, they are known to change character when transferred to different soils; but, for early crops, the ash-leaved kidney is deserving of culture, especially in its improved form. The Early Fulham and Early Manly are both good; the Forty-fold, a pink potato, is good for main crop; Regent and Flourball are good general croppers; and Fluke's or Kirk's kidney for late crops.

935. *Turnip.*—A sowing of early Dutch turnip may be made in this month. This crop is very apt to run to seed instead of swelling at the root, if sown too early; but a great deal depends on the kind of soil: it does best on a rather retentive soil; but should be in an open, unshaded piece of ground, for it never does much good if shaded or overhung by trees. A dressing of soot at the time of sowing makes a vast difference in them on their

first appearance through the soil, and seems to benefit them greatly. The seed should be sown evenly but rather thin,—a small quantity of it will cover a large piece of ground, but should be regularly scattered. Broadcast-sowing is preferable for this crop; but if sown in drills, they should be 15 inches distant from each other, and the plants left not less than a foot apart in the rows; or even a greater distance is better, as this crop resents anything like crowding. If sown in drills, let them be very shallow—half an inch is deep enough. As soon as they are up, use the hoe unsparingly, and see they are thinned to the proper distance before the roots begin to swell. If attacked with the fly, which happens in dry weather, dust with lime or soot while the dew is on them: on light soils they will repay copious watering.

936. *Carrots* may still be sown; and those who know the sweetness and delicacy of the short-horn kinds, in their young state, will take care to have a supply of them. They may be sown till the latter end of July. Sow broadcast on beds, and thin to three or four inches, as these sorts do not require so much room; larger sorts are better sown in drills. If it is preferred to drill the seed in, let the drills be one foot or 15 inches apart, as shallow as possible, and sow the seed continuously along the drill, or three or four seeds at intervals of six or eight inches: this economizes the seed, and admits of going amongst the plants without treading on them. Light ground should be trodden before it is drilled: the seed hangs together, and should be separated by rubbing it up with soil, if sown broadcast; but this is unnecessary if sown in drills. The seed is very light, so that a calm day should be chosen for sowing: a little wind is apt to blow it anywhere but the right place: it takes from one to three weeks to germinate. As soon as it is well above ground, use the small hoe unsparingly, and thin out to not less than six inches apart; as they advance, continue using the hoe both to destroy and prevent the growth of weeds, and also for the benefit derived from loosing the ground. They may be drawn for table as soon as large enough; but the main crop for storing should not be taken up till quite the end of October, or even later, unless severe frosts set in. There are many different sorts; but the Dutch Horn is generally used for forcing and early crops; intermediate for second or late crop; the improved Altringham is good for main crop; but much depends on soil and locality. The same directions apply in most respects to the culture of parsnips. Let the soil be deeply worked, if possible trenched in the manner described in a former page, keeping the top spit uppermost, allowing it to be well pulverized by frost. Sow in drills 18 inches asunder, drop three or four seeds at intervals of nine inches; when two inches high, pull out all but the strongest of each cluster, and use the hoe freely.

937. *Onions* are sown either broadcast or in drills; in either case the distance should be not less than six inches from plant to plant when they begin to bulb. Sow the main crop the third or fourth week this month: an early sowing may be made late in February, or first week in March; and for pickling, or for drawing while young, during the summer and autumn, they may be sown as late

as midsummer. This crop requires a good rich soil, or one that is made so by proper manuring. If sown broadcast, mark the ground into 4- or 5-feet beds; sow the seed evenly, tread, and rake. It may be sown thickly if it is desired to draw young for the table, or they may be thinned out by this process, leaving those that are to bulb six inches or even a foot apart: the same applies to sowing in drills, which should be a foot apart. The hoe should be freely used among them while growing. A sowing may be made in October, to stand the winter, for early spring salading. The silver-skinned is usually sown for pickling; the tree and potato onion are both very useful varieties: both are propagated by offsets, which are planted early in April; the difference being, that the tree-onion produces above ground, on a branching plant; the potato-onion, as its name implies, beneath the surface. Garlic and shallots are planted about the same time and in the same manner, allowing for the two latter a distance of 8 or 10 inches, the two former 15 or 18 inches apart. To procure onion-seed, plant some good, sound, full-grown onions in an open situation in March, placing them 6 inches deep and 15 apart. As they grow, protect the stems, which are very brittle, by means of a stake driven into the ground at each end of the rows, and strings passed each side of the stems, and fastened firmly to the stakes. This should be done in time to prevent any getting broken, which would reduce the crop. Onions are usually considered a gross-feeding crop, but they grow well on any moderately rich or well-manured soil, and if, in dry weather, they can be well watered, and occasionally with liquid manure, they will grow very fine, and are a very profitable crop.

938. *Leeks*, for the main crop, are usually sown this month, about the same time as onions. Some gardeners sow them with a small sowing of onions, the latter being drawn young for salading, the leeks being left on the bed, or planted out. Some sow them in drills 18 inches or even two feet apart, and thin them to a foot or so apart in the row, planting the thinnings at the same distance. This gives room to draw earth up to them for the purpose of blanching the root and stem. Sow very shallow, tread, and rake, provided the ground admits of it; thin before the plants interfere with each other, and water in dry weather. This crop delights in a light rich soil, and in moist seasons grows very large. The London flag is the sort most usually grown; but the Scotch or Musselburg is esteemed by many, as growing larger and better.

939. *Red Beet* should be sown at the beginning of the month. Let the ground be fully exposed to the sun, and quite open and away from trees. Sow the seed in shallow drills 15 inches apart, and drop three or four seeds at intervals of 10 inches or a foot apart, or sow thinly along the drill: cover, tread, thin, and rake the ground roughly with a wooden rake, drawing off large stones, &c., that may be on the surface. Sowing this seed in drills is preferable to sowing broadcast, because it not only gives greater facility for thinning out and using the hoe between, but it insures a regular crop without wasting the seed, the plants being at regular distances. When they are about a foot high, thin them to not less than a foot apart, leaving the best-coloured rather than

the strongest plants; for the better it is, the less likely it is to grow strong and large. Large roots are not esteemed, being deficient in flavour. One of the best sorts for ordinary culture is Cottell's blood-red: it is of fine colour, and not apt to grow too large. Of equal merit is Henderson's pine-apple.

940. *The Spanish Beet* is usually sown in March, and allowed to grow large: the leaves are eaten in the same way as spinach. It is a useful summer crop, because spinach soon runs to seed in that season, when this beet makes a very good substitute, and may be grown advantageously by those who desire to have a continuous supply of vegetables throughout the season.

941. *Cabbages.*—The first week in this month is a good time for sowing the various sorts of *Brassicæ* for main crop, selecting the beginning of the month for the meridian of London, and a fortnight later north of Cheshire and Lancaster. If sown earlier, except for early use, they are apt to make a deal of superfluous growth, and grow up lanky, in place of being firm and stocky. The treatment for all is nearly the same. Let the seed-beds be open, and away from trees or other shelter, and tolerably dry, but not parched, at the time of sowing. Mark out for each sort its allotted space; give plenty of room,—at least a square rod; sow the seed broadcast regularly over the ground, so that they do not come up thicker in one part than another; tread it well in, unless the ground is wet and binding; in that case stand in the alleys, rake level, and pat the surface with a piece of flat board: this will press the seed in without hardening the ground. If dry enough to tread, rake the surface even. If the weather is dry, and continue so, it will be necessary to give the seed-bed a copious watering to keep it moist, so that the surface does not cake. When the seed is up, keep the beds moist, so as to promote vigorous growth; giving a liberal dusting of lime, salt, or soot now and then, which will benefit the young plants, and prevent the attacks of the fly. When large enough to handle, thin them, and prick out those drawn, in nursery-beds five or six inches apart from each other.

942. *Peas* for late crops may be sown any time this month. The tall-growing sorts are best to sow now, and if sticks are plentiful, these should have the preference. If on good soil, or well mulched, the yield is far above all other sorts; the *Ne plus ultra* yields an enormous crop: sow them six or seven feet apart from row to row, or 10 or 12 feet, where crops of cabbages can be sown between the rows. Any of the wrinkled or marrow peas do well sown at this time: earth-up, mulch, and stake those sufficiently advanced. Good peas for sowing at this time are Hair's Dwarf Green Mammoth, Knight's Dwarf Green, British Queen, Tall White Mammoth; *Ne plus ultra*, Knight's Tall Green. The first two grow about three feet high, the others about six feet.

943. *Salading.*—Lettuce should be sown for succession; the large Drum-head, or Maltese, does well sown at this time; but cos lettuces are generally preferred, as being most crisp; but any sort will do sown at this season. *Chicory* is used both as a salad in spring and also the roots as a vegetable: it should be sown late this month and the two following. Sow in shallow drills

a foot apart, and thin to 8 or 10 inches in the row: they need not be disturbed again until taken up for use, or to put in a frame to blanch the tops; but, in common with all crops, they must be kept clear of weeds. *Parsley* may be sown at any time, but a principal sowing is usually made now. Some prefer sowing in shallow drills, 8 or 10 inches apart; but I believe an even broadcast sowing is preferable, at least if the ground is in condition to be trodden, which appears to fix the seed in its place, and, after raking, leaves a firm, even surface, more comfortable to step on afterwards. Use the small hoe as soon as up, and thin out gradually, till the plants are ten inches or a foot apart. *Chervil* is sown and treated in a similar manner, and is much used in some families. See that a good curled sort is sown. *Marjoram*, of the sweet, or knotted kind, is usually sown this month, on a clear open spot: the seed is small, and should be sown on the surface, trodden, and raked evenly, and watered in dry weather. In common with most herbs, it takes a long time to germinate; so that care should be taken that it is not choked with weeds, which, being of much quicker growth, are likely to do so if not destroyed. They should be removed by the hand, until the plants are large enough to use the small hoe with safety. *Pot Marjoram*, winter and summer *Savory*, *Thyme*, and other herbs, may be sown and treated in the same way.

944. *Scorzoneras and Salsafy*, for the main crop, should be sown the first week this month. Let the ground be deeply worked, but add no manure. Sow in drills an inch deep and 15 inches apart. Tread and rake the ground even.

945. *Radishes* do best if the beds are hooped and netted,—small salads, if under hand-glasses; but they will do if wholly uncovered. *Mint* should be transplanted as soon as the shoots are three inches high; if it is to be increased, merely pull up the shoots with a piece of root, and dib them in nine inches apart, and water them. *Sage* is easily propagated by slipping off young shoots, and dibbing them in where they are to remain. They will want watering, but no shade or covering. *Savory* may be treated in the same way. *Thyme*, marjoram, pennyroyal, &c., may be increased by dividing the roots or slipping off pieces of the plants with roots to them, and planting with trowel or dibber, taking care to water well. Sweet or knotted marjoram must be sown every year in the same way as basil; but if sown on the open ground this month, they do well, although they are a long time coming up. Nearly all sweet and pot-herbs may be raised from seed if sown now; and some of those used medicinally, as horehound, chamomile, &c. Tansy, wormwood, &c., are best propagated from offsets.

946. *Rampion* may be sown about this time, either in drills a foot apart, or on the surface, broadcast, treading and raking it in: in either case it may be thinned to 8 or 10 inches apart, and may be used in the summer and autumn in the same way as spinach, and the roots as a winter vegetable.

947. *Salsafy* may be sown about the end of this month, or beginning of next. It is best to sow this seed in drills 15 inches apart, or thereabouts, and thin to six inches in the row. The roots of the plant are usually eaten in the same

way as radishes, being often a substitute for them during the winter: in the spring-time, the young shoots are blanched and used as seakale. *Scorzonera* is sown in the same manner; and, by some, is much esteemed. To have it large, it should remain over the second season. It seldom grows large enough for use the first year, but is none the worse for remaining two or even three years before using.

§ 6.—COTTAGE GARDENS.

948. Dill, fennel, horehound, and other herbs, may be sown about the end of this month. The particulars relative to the culture of vegetables are the same, applied to the large garden, the allotment, or the small plot of the cottager; but the cottager or the allotment-holder naturally desires to grow the most useful and profitable crops, and has neither time nor room for experimenting upon the various subjects placed before him; consequently he may save a great deal by becoming acquainted with what will best repay his time and labour. Perhaps the potato is more largely cultivated than any other crop among cottagers and allotment-holders, because it is of more easy culture, and, where it does well, is more remunerative than others; but the potato disease, for which no certain remedy is known, renders it a precarious crop. Parsnips are not likely to supersede it, because not so generally liked; but those who are fond of this root will find it a profitable crop. Jerusalem artichokes yield abundantly, and will be found remunerative to those who like them. Cabbages are very profitable things to grow; they head during the summer and autumn, and yield an abundance of sprouts during the winter, at which time they are excellent and nutritious food. Cottager's kale is an excellent vegetable: after the head or top is cut for use, it yields an abundance of sweet and wholesome sprouts during the winter and spring months. Brussels sprouts may be grown for the same reasons. Broccoli, of such sorts as the Early Cape and Walcheren, which head the same year as sown, may be grown advantageously; but late sorts, which occupy the ground nearly a twelvemonth before they are fit for use, are not so profitable. Scarlet-runner beans are always remunerative; they yield, in abundance, a sweet and nutritious vegetable, and continue bearing a long time: no cottage garden should be without them. French beans are also profitable for cottagers, and also broad beans for summer use. If peas are grown, it ought to be late tall sorts, as Ne plus ultra, which bear immensely and are saleable, but require tall sticks, like scarlet-runner beans.—F.C.

§ .7—THE CULTURE OF FLOWERS UNDER GLASS.

949. *Conservatory.*—While any probability of spring frosts remains, ventilation must be cautiously given, especially with newly potted plants and tender flowers from the stove or forcing-house. As they begin to grow, air should be given whenever it can be done with safety. Where artificial heat is used,

ventilation may be rendered safe by using extra firing. Camellias and other plants with large coriaceous leaves, if not perfectly clean, should be washed with sponge, and, if necessary, with soft soap, to eradicate the haunts of insects; and a moist, genial heat maintained by sprinkling the floor, stage, and pipes. Boronias, Lechenaultias, Chorozemas, and Tropæolums will now be fit to remove to the conservatory. Place them in as airy a situation as possible, maintaining a temperature of 45° to 50° at night, rising 10° or so from sun-heat.

950. It may be partly on the principle of contrast with the dormant state of plants out of doors, but I think chiefly on account of the intrinsic beauty of its occupants, that the conservatory is so much more beautiful for the next three months than it ever is afterwards throughout the year. There is a delicacy and fragrance about spring flowers that never seems equalled afterwards.

951. In addition to the plants named last month, this perfume will now be enlivened by the lily of the valley, roses, sweetbriar, and violets. Either is exquisite alone; but, all combined and added to the odour of lilacs, hyacinths, narcissus, and other spring flowers now filling with fragrance an artificial, partially confined atmosphere, constitute a delicious odour.

952. *Greenhouse Plants* divide themselves into hard and soft-wooded plants. Among the former are Boronias, Hoveas, Acacias, and Chorozemas, Epacridæ, Genistas, and Pultenæas, which will now be coming into bloom, if well managed.

953. Azaleas will be coming forward, where there is a good stock of such plants as *A. lateritia*, *Gladstonesii*, Prince Albert, *præstantissima*, and others of similar habit: their bloom should be retarded by placing them on the shaded side of the house. Plants that have been forced should have the seed-vessels picked off, and shifted, if the pots are tolerably full of roots.

954. *Heaths* in full growth require an astonishing quantity of water at this season of the year; mere driblets are certain death to them. When the pots are full of roots, they should be gone over two or three times a week, and filled to the brim with water. The longer it is in passing through (provided the drainage is all right), there is the greater necessity for repeating the dose, as dry peat-earth is one of the worst conductors of water. When the water remains longer than ten minutes on the surface, a cold bath for twenty-four hours is the only remedy. Unless the soil is hopelessly dry, this will cure it, and it must not be watered again until the ball is turned out and examined. The evil of excessive dryness is often increased by excessive drainage. Heaths, while they cannot endure stagnant water, like a moist genial soil when making rapid growth. They resemble neither epiphytes nor orchids, and some of them naturally inhabit almost swampy districts. Give air more liberally as the sun strengthens and the days lengthen, but avoid the cutting draughts so characteristic of the month.

955. *Pelargoniums*, and other soft-wooded plants, now growing rapidly, require every attention. Water carefully, so as to avoid any check in their growth, using manure-water occasionally, composed of equal parts of sheep,

cow-, and horse-dung, and a little lime. Fill up the tub with soft water, and mix it well, and draw it off clear, when settled, into another tub; to this mixture add two parts of soft water to one of the liquid, and water once a week with it during the growing season. Ventilate freely on warm sunny days, and syringe with water of the temperature of the house. *Scarlet Geraniums* require similar treatment to promote their growth. Cuttings struck now in 48- or 32-sized pots will fill the pots with roots by the autumn, and bloom through the winter months. *Calceolarias* should now have a final shift, using a light rich compost, and pegging them down to encourage roots up the stem, watering cautiously when dry, and fumigate for green-fly, ventilating freely every opportunity.

956. *Fuchsias.*—This is still a good time to buy in plants. The variety now is almost endless; but many of them are almost the same, with a new name. My favourite flower, as a dark fuchsia, is still—

Souvenir de Chiswick, with rosy crimson sepals and tube, and violet corolla, and beautifully-recurved broad sepals. As a party-coloured variety of perfect habit, nothing can exceed Venus de' Medici, with white tube, blush-white sepals, corolla deep violet.

Rose of Castile,—blush-white sepals and tube; rosy purple corolla. These can be bought anywhere at 1*s*. each, and I hope every reader will procure them forthwith.

Sir Colin Campbell (the best double I have yet met with),—crimson tube, and sepals well reflexed; corolla dark purple.

Madame Cornelissen,—sepals very long; pure white corolla. The flowers of these are not only good, but the *habit*, a great point in double fuchsias, is also excellent.

Amazement is said to be the best double fuchsia,—sepals rich crimson, reflexed; corolla rich dark purple.

Bianca,—scarlet tube and sepals.

Black Prince,—broad sepals, carmine-scarlet; corolla very dark purple.

Catherine Hayes,—sepals scarlet; light-blue corolla; excellent habit (good).

Coronal,—sepals vermilion, nice-curved; corolla violet and rich purple.

Crown Jewel,—sepals crimson; corolla black; habit distinct; leaves long and peculiar.

Dr. Livingstone,—delicate white tube; petals well recurved; corolla blush; very distinct and delicate-looking.

Duchess of Lancaster,—very old, still maintains its ground; white tube and sepals; violet corolla.

Fairest of the Fair,—white tube and sepals; corolla rich violet.

Forget-me-not,—sepals scarlet and carmine; corolla violet, red, and purple.

Goliath,—coral-red, with immense fruit, of a light green colour.

Guiding Star,—blush-tinted tube; sepals white, nicely-recurved; corolla velvety purple.

La Crinoline—sepals crimson; corolla bluish.

Leoline,—sepals crimson; violet-blue corolla.

Le Prophète (a great improvement upon Wonderful, which is still, however, a good variety),—sepals crimson; corolla violet.

Leviathan,—sepals very broad, rich crimson, reflexed, and completely recurved; corolla deep purple, of an immense size; altogether, a fine bold flower.

Lord Elcho,—sepals carmine-scarlet; corolla violet-blue, beautifuly cupped.

Marvellous (an immense double variety),—crimson sepals, and dark corolla; bad habit.

Perseverance,—sepals carmine, salmon-tinted; corolla rosy lilac.

Prince of Orange,—sepals scarlet, wide-curved; habit excellent.

Prince Frederick William of Prussia,—sepals carmine and red; corolla plum-colour; good shape.

Queen of Hanover (an old favourite, pure and distinct),—sepals white; corolla carmine.

Star of the Night,—sepals rich carmine; corolla violet-purple (a fine striking variety).

Tricolour and Tricolour-flower are both striking and pretty varieties, and are *three*-coloured.

Victor Emmanuel,—sepals red; corolla slate-coloured (good).

White Lady,—one of the best white varieties,—an improvement on Princess of Prussia.

957. Whoever has a greenhouse two yards square, or a window free from dust, may grow one or more fuchsias. In fact, it has become quite a window-

plant, and no plant is better adapted for the purpose. To grow them, however, in the highest perfection, requires some judgment and skill. Cuttings should be inserted in pots filled either with loam and leaf-mould, or peat and silver-sand, in equal parts, to within an inch and a half of the top. Place over this three-quarters of an inch of silver-sand, and level the surface to make it firm; then insert the cuttings,—about one inch long is the proper length,—and plunge the pots in a bottom-heat of 60°, either in a pit or propagating-house: if the latter, cover them with a bell-glass. In three weeks they may be potted into 3-inch pots, and replunged in the same bed, keeping them at a temperature of from 50° to 60°. As soon as the roots reach the sides of the pots, the plants should be shifted into fresh pots, until they receive their final shift into 6-, 9-, or 12-inch pots, towards the end of June. The size of the pot must be regulated by the period when they are wanted to bloom. If in July, a 6- or 9-inch pot will suffice; if in September or October, a 12 will not be too large. During the period of growth, the plants will require stopping at least six times, care being taken never to stop the shoots immediately preceding or directly after the operation of shifting into larger pots. If the pyramidal form of growth, which is the best of all forms for the fuchsia, is adopted, the plants, from the first, must be trained to a single stem, and all the side-shoots stopped, to make the pyramid thick and perfect. If the bush form is wanted, the whole of the shoots should then be stopped at every third joint, until branches enough are secured to form the bush, and then be trained into the desired shape. A regular moist genial temperature must be maintained during the entire period of growth, never exceeding 60° by fire-heat. During bright sunshine, the glass should be slightly shaded with tiffany or other material: the delicate leaves are easily injured, and the plant should never receive the slightest check by being allowed to flag. Fuchsias, while having their preferences, will grow in almost any soil. Garden-loam and leaf-mould, in equal proportions, with some broken charcoal and sand, do very well. I prefer feeding them with manure-water to mixing dung with the soil. After they are well rooted, they should never be watered with clear water. A carefully-shaded conservatory, guarded against the ingress of bees, is the best place for them when in blossom. In such a situation, they will continue in bloom for three months if the seeds are constantly picked off. Most of the species are edible, and some of the green-coloured varieties really form a good dessert. Sir Colin Campbell is one of the finest fruiting kinds, and the best flavoured of the dark-fruited varieties; but its great attractions are the flowers. Nothing can be more graceful, either in form or flower, than noble plants of fuchsia. They have a grace and beauty peculiar to themselves; and their price is sufficiently low, and their culture easy enough, to bring them within the reach of all.

958. *Begonias.*—Most of the variegated varieties do best treated as half-deciduous. Retaining a few plants for winter decoration, I compel the main stock to rest for the winter; that is, they are kept warm and very dry, so that many of the leaves fade. Now is the time to shake over the dry soil,

re-pot, and plunge into a bottom-heat of 75° or 80° ; or they will start very nicely on a stone shelf. The rapidity of the change from semi-death to vigorous life is like a resurrection. I grow many hundreds of these charming plants, and find that this treatment suits them admirably. A list of the best varieties will be given soon, with a full monograph of their culture. Start a few pots of *Caladiums.*—Their adder-tongued-looking leaves have a striking effect, and, with foresight, some may be had throughout the year. Keep dormant plants quite dry. In this state they are liable to damp and rot. The beautiful Argyrites is often killed by attempting to keep the plant in leaf all winter, and by watering it to secure this object. Nature tells them all to rest for three or four months, and they will sooner perish than grow.

959. *Orchids.*—As soon as these begin to grow, a general potting should take place. The beautiful palm-like leaved cyrtopodiums should be shaken out and potted in a compost of equal parts loam, leaf-mould, turfy peat, sand, broken crocks, and charcoal. They are noble-looking plants. Bletias may be treated in the same manner, using more loam, however, for them and the beautiful dove-plant, Peristeralata. Plunge Aerides, Vandas, &c., in water, when their flower-stems appear, until they are thoroughly soaked. Shift into fresh baskets Longaras, Brassias, Cropegias, &c. Keep Oncidiums rather dry at present. The beautiful old Goodyera discolor will now be in full blossom. Its striking dark purple-veined leaves, and noble heads of pure white blossom, make it still a charming object. Clean all plants when in a dormant state, and secure a moist growing atmosphere of 70° to 75°. The mechanic and cottager who have no houses may make their windows very gay by taking up a few patches of crocuses, violets, hepaticas, pinks, &c., carefully potting them, and placing them in a sunny window.

§ 8.—Fruit-Culture under Glass.

960. The changeable temperature of the early spring months is a source of immense anxiety to the gardener. From cloud to sunshine, and from sunshine to storm ; warm days succeeded by frosty nights, and cold winds by perfect calms, are constant occurrences, and keep the gardener and his assistants continually in a state of uncertainty. It is one of the greatest trials to a master, as men will often look up to the sky, measure the size of the cloud, and calculate *time* in favour of their own indolence. I have often made my youngsters fetch a pair of steps and thrust them up among vines, figs, and strawberries, to enable them to feel what the plants were enduring. Five minutes' penance in such a position, without hat, cap, or coat, proves a very efficient lesson to young gardeners. By all means scan the sky, measure the size and observe the direction of these black clouds, heavily laden with their freight of hail or snow, but only for the purpose of being on the spot the moment they impinge on the sun's rays, and of being at your post before they have quite passed over. With every attention and skill, proper ventilation is a

work of great difficulty, from the fact that on the brightest days the air is often only a few degrees above the freezing-point. Unless provision is made for introducing the external air through a heated chamber, no *front* air should be admitted until the end of April or beginning of May. In fact, I scarcely ever give direct air in front of vineries until the fruit is ripe. In the absence of some better means of partially heating the air admitted at the back or top of the house, before it reaches the plants, a close woollen net, or double or treble Nottingham netting, might be fixed over the ventilators or open spaces where the lights run down. The force of the current would be broken, and the air would be partially heated as it was *sifted* through the fine meshes of the netting. If it were practicable to keep this netting wet, the rapid evaporation from it would tend largely to moderate the temperature of the air, and prevent its being so rapidly raised by the influence of the sun. But an equable temperature is scarcely more important than the amount of moisture contained in the air. Hydrometers, although not yet common, will soon be felt to be as necessary as thermometers. At present every gardener worthy of the name is a living hydrometer, and it is astonishing how perfectly the *seasoned* ones can gauge the amount of water suspended in the air.

961. *Vinery.*—As soon as the grapes begin to swell again, a rise of 10° may take place, which may be continued until the first spot of colour appears. The minimum may then be from 60° to 65°, with a *little air constantly* in the house, never omitting to close it at night. Successional houses will now require great attention,—disbudding, thinning, and tying the shoots, &c. Raise the temperature, through the different stages, as recommended last month. Stop the young shoots a joint beyond the bunches, excepting always the leading shoots on young vines. After a few stoppings, if the leaves become crowded, take the young wood off at the same point at every stopping, as two or three large leaves beyond the bunch are sufficient to supply its wants, and more useful than a number of small ones.

962. *Pines.*—Shift all the succession plants as soon as possible. It will facilitate this operation very much if one man places his arms carefully round the leaves and another slips a tie of soft matting round the plant, sufficiently tight to compress, without bruising, the leaves. This will render the plants manageable, and enable you to *pot* without *gloves.* I never tried the muffled system myself, and don't believe that any one can pot a plant properly with gloves on. Don't follow the barbarous disrooting system. If the plants have been properly kept during the winter, remove the crocks, gradually unwind the roots, take away as much of the old soil as possible, pull off from three to six inches of the bottom; place the plant two or three inches deeper in the new pot than it was in the old, as pines root up the stem, and have no permanent collar, press in the earth firmly, and the work is complete. Turfy loams mixed with a little charcoal and broken bones, is the best compost, enriching it with manure-water during the rapid growing and fruiting stages. If fern or leaves are used for bottom-heat; this will now require renewing. This work

should proceed at the same time as the potting, so that the plants may at once be removed back to their proper quarters. Keep the plants level during the process of plunging the pots, and after two rows are plunged, cut the ties and arrange the leaves of the back row; plunge another row, then cut and arrange the second row; and so on throughout. A mild day must be chosen for these operations, as five or six hours' check from cold will often throw a whole pit of succession pines into premature fruit,—one of the greatest calamities that can happen to the cultivator.

963. *Figs.*—A dry close atmosphere often causes the embryo fruit to drop. Dryness, or excessive moisture at the root, may produce the same results. When the fig is in full growth, the latter evil is almost impossible; but there appears to be but little demand upon the roots for moisture until the leaves are fully expanded. Maintain a temperature of 60°, and syringe the leaves daily.

964. *Orchard-House.*—Unless this is heated, keep it constantly open when the outside temperature is above 32°. Success here depends upon retarding the trees as much as possible. If they start now, and we have a sharp frost in April, the chances are you will lose the crops. If a pipe runs round part or the whole of a house, it may now be allowed to move at a temperature of 40° to 45°. Place plums, apricots, and cherries in the coolest part, nearest the ventilators. See that the trees in pots and borders are well watered previous to starting, and give all the air possible to keep down the temperature during frosty weather.

965. *Strawberries.*—Give plenty of air when in bloom, maintaining a drier atmosphere during that process. After they are fairly set, they will bear a temperature of 70° to swell off; but 60° to ripen, with abundance of air, is quite enough. On shelves, place each pot in a pan, or within a second pot half-filled with rotten manure. Water with manure-water, syringe twice a day, and keep the plants clear of insects.

§ 9.—HOTBED AND FRAME CULTIVATION.

966. *Cucumbers,* in growing condition, require more air in the daytime as the sun acquires more power; healthy plants will bear the full light without shading: if they droop under its influence while air is given freely, something is wrong at the roots or collar, and fresh plants should be raised to supersede them, provided they do not recover. Air should be admitted, in proportion to the weather, and as this varies every day, more or less;—watchfulness and care are necessary. Peg down the bines, and pinch off shoots that are not wanted, and all shoots above the fruit; add fresh soil and fresh linings outside as required.

967. *Melons* should be syringed occasionally with water of a temperature rather higher than that of the bed: all shoots not wanted pinch off, so that the strength of the plant can go into the fruit. Fresh cucumbers and melons should be started for successions. The heat of the dung now lasts longer, and is not counteracted by severe frosts, and the sun begins to yield more heat;

the days also are longer; the plants receive more light, and consequently are likely to be more stocky and short-jointed, the dung, however, being well prepared, as formerly described. Much time is saved by raising the plants in pots upon the fruiting-bed already going; if none are in operation, make a small bed with part of the dung, and cover it with a small frame or hand-glass, as formerly described. Hotbeds at this time of the year are of the greatest importance in gardens where other appliances for raising plants are limited. The most tender plants may be raised from seed, and cuttings of almost all plants strike root most readily in them.

968. A melon-pit, divided into compartments of two or more lights each, will be useful at this time, and will answer most of the purposes to which frames are applicable. Vegetable marrows, ridge cucumbers, tomatoes, capsicums, chillies, tea-plants, egg-plants, may be sown and raised with the aid of manure, managed as for melons. This is a good time to raise all these, or to pot them and plunge them in the dung, if already raised.

969. *Seakale* should, when cut, be removed; the roots planted in the open ground, if required for increase.

970. *Asparagus* should be watered with weak liquid manure; but care should be taken not to overdo it: be rather sparing of stimulants than otherwise.

971. *Potatoes* may be tried by sorating away the earth near the collar. The largest tubers are near the surface generally, and may be removed without disturbing the plants, which should be left to perfect the smaller ones: water, if required; but liquid manure is not necessary.

972. *French beans* that are flowering should receive plenty of light and air, and be kept tolerably dry overhead, and tied up to sticks if they hang over: keep the roots moderately moist; but, if allowed to root through the pots, they will require no other stimulus.

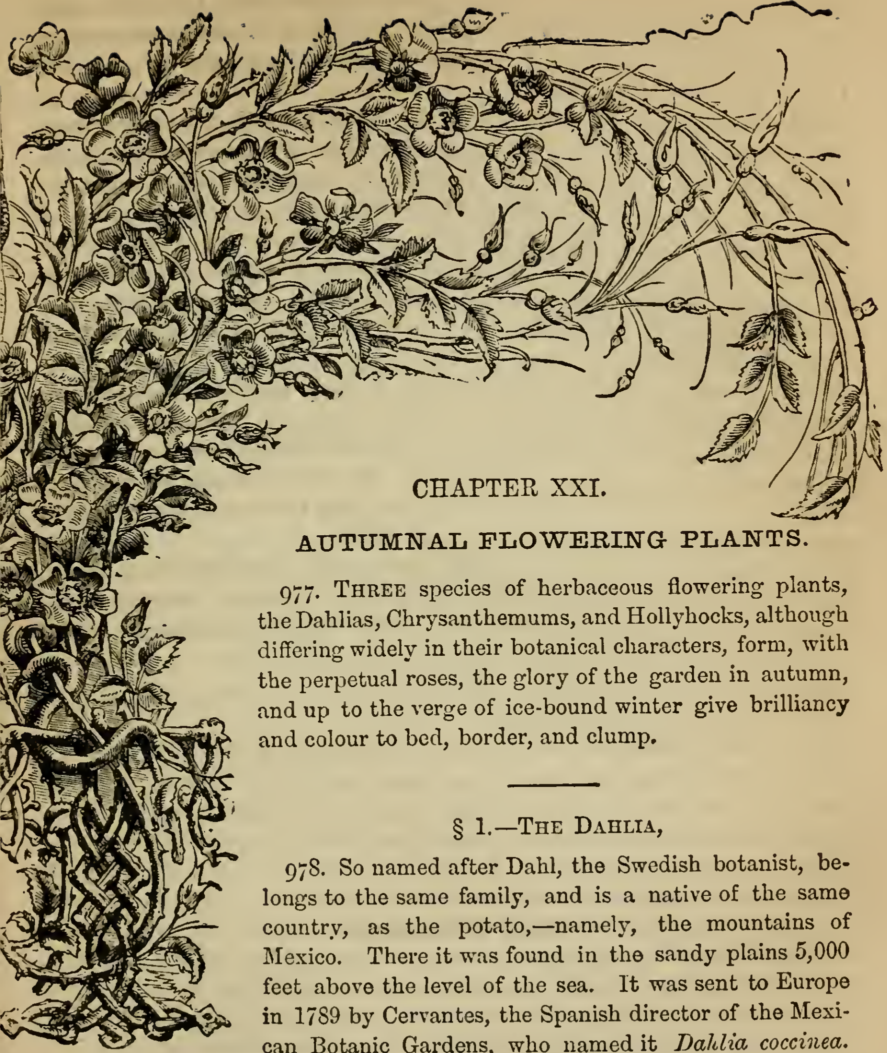
973. *Strawberries* will require plenty of water and a liberal supply of liquid manure. While the fruit is swelling, give, if possible, more heat and more air; if kept close, the fruit is apt to fog or mould without swelling. In damp weather, tilt the lights; in dry sunny weather, push them down.

974. *Mushroom-beds* may be made out of doors this month. Prepare the dung by turning it over five or six times; mix a portion of loamy soil with it, and some recommend a sprinkling of salt; build the bed up in a ridge of 4 feet high and 5 or 6 wide; dig a trench round it to drain it; beat it firmly, and when about 80°, spawn it by making shallow holes with one hand, thrusting pieces of spawn into them with the other. Some recommend waiting a day or two after making the bed, asserting that the weight of the casing, as it is called, causes a rise in the temperature, which might endanger the spawn. It is as well to be cautious; case the bed with 2 or 3 inches of loamy soil, rather stiff, and cover with 6 or 8 inches of clean straw; and to keep this in its place cover it with mats. This will protect it from winds and rain. Mushrooms are sometimes grown in large pots, boxes, or baskets. In either case the process is this:—Prepare some stable-dung as for making a mushroom-bed. When well worked and sweetened, fill the pot, &c., five-sixths

and press it firmly down; then lay in pieces of spawn, and top with loamy soil, placing it in a warm place, as under the stage in a warm greenhouse or stove, forcing-house or pit, or even a hotbed frame. They come into bearing rather quicker than on a bed in a mushroom-house: they are often grown on shelves, the house being quite dark and furnished with hot-water pipes. This is the most satisfactory mode of growing them, the other being a make-shift. In this case, a mixture of horse-, cow-, and sheep-dung, loam, and road-sand, is well worked together, and placed on the shelves, mixed with pieces of spawn, and the whole pressed firmly down, and heat applied of an average of 70°: vapour-troughs should be provided, for the mushroom will not bear a dry heat. Water should be applied when required, but very gently, and rather sparingly than otherwise, and of a temperature rather above that of the bed at the time.

975. *Tender Annuals* should now be sown in heat, and half-hardy ones in cold-frames. Pot or prick off any that may be up. Balsams, cockscombs, and globe amaranths, still require heat, and should be kept near the glass, to prevent being drawn up. Cuttings of all soft-wooded plants should now be struck in great numbers for bedding out: they root and grow freely in hotbeds.

976. *Salads* may still be sown in cold-frames, and a good plan is to move the frames from place to place, merely using them to protect the seeds from birds; or a frame placed over rhubarb will bring it on fast: lettuces, &c., may be urged on in the same way. F. C.



CHAPTER XXI.

AUTUMNAL FLOWERING PLANTS.

977. THREE species of herbaceous flowering plants, the Dahlias, Chrysanthemums, and Hollyhocks, although differing widely in their botanical characters, form, with the perpetual roses, the glory of the garden in autumn, and up to the verge of ice-bound winter give brilliancy and colour to bed, border, and clump.

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§ 1.—THE DAHLIA,

978. So named after Dahl, the Swedish botanist, belongs to the same family, and is a native of the same country, as the potato,—namely, the mountains of Mexico. There it was found in the sandy plains 5,000 feet above the level of the sea. It was sent to Europe in 1789 by Cervantes, the Spanish director of the Mexican Botanic Gardens, who named it *Dahlia coccinea.* Under the impression that sandy soil was its proper compost, it lingered in our gardens, a miserable scraggy plant, till 1815, when a fresh and improved stock was introduced from France and it was taken up by the florists. Under the influence of cultivation, it has been so much improved in form as to become one of the finest flowers of the garden, while the shades of colour are so numerous, so diverse, and so opposite, and in so many shades, that it would be difficult to find another plant at once so hardy and so showy. Probably its importer never dreamed that the naked stem and imperfect flower of *D. coccinea* would, by the efforts of cultivation, become so ornamental in European gardens; never-

theless, such it has become ; and few gardens are now without their collection of dahlias, while the nursery lists of named varieties swell into hundreds, of every shade and colour, except the much-prized blue, which was for some years the object of the florist's pursuit.

979. Dahlias may be multiplied by seeds, by dividing the tuber,—every eye, when separated with a portion of the tuber, making a plant. Others, again, cut off the young shoots under the lower leaves, and strike them in small pots filled with sandy soil. Experiments have even been made to ascertain how far grafting would succeed with the dahlia.

980. *Seedlings* are procured by sowing the seeds in shallow pans and plunging them into a hotbed, or by sowing on hotbeds prepared for the purpose, in March. The soil should be light and sandy, with a mixture of peat-mould. The seed should be chosen from the best varieties only ; it should be lightly covered with soil. A few days will bring them up, when they require all the air which can be given them safely. In April they will be ready for potting off either singly in the smallest sized, or round the edge of 6-inch pots, which strengthens them for final planting out. Towards the middle or end of August, if successfully treated, they will begin to bloom : at this time they should be examined daily, all single and demi-single blooms thrown away, unless they present some new colour or show some peculiar habit of growth, which may be improved by further cultivation and crossing. Caution in this respect is the more necessary, as it is a habit of the dahlia to improve under a second year's cultivation, some of our finest varieties having come up with indifferent flowers as seedlings. When done flowering, the young bulbs are taken up and treated as old tubers.

981. *Cuttings* are taken as follows :—In February or March, and even as late as the first week in April, the tuber, which has been carefully wintered in a dry place, is placed in soil placed over a hotbed, and in a very short time as many shoots as there are eyes in the tuber make their appearance. As soon as these are two inches long, they are taken off just below the leaves, struck singly in small pots, and again placed in the same hotbed. Others prefer cutting up the tuber as soon as the eyes are distinguishable, and replacing them either in the soil of the hotbed or in pots. Mr. T. Barnes, an undoubted authority, tells us that to obtain short-jointed, stout, and healthy plants, "they should be rooted from cuttings taken off in April, and struck in a gentle hotbed." As soon as rooted they should be potted in 5-inch pots, and again placed in a gentle heat, but with plenty of air. "Cuttings struck at this time," he tells us, "are more healthy than those struck at an earlier period," and consequently form better flowering plants. A week after they are potted they should receive a watering of liquid manure made from guano and powdered charcoal, well mixed with rain-water, repeating this occasionally till the time of planting out ; fumigating the frame with tobacco, should there be any appearance of the green-fly.

982. Early in May beds are prepared for their reception, if they are to be grown in massed beds. The form of the beds will depend on the general de-

sign of the garden : if a portion of the garden is devoted to them, either for the plants or the flowers, they will be best displayed in beds three feet wide, with alleys between. The beds being marked by stakes placed at each corner, four inches of the surface-soil is removed, and four inches of thoroughly rotted manure put in its place, and the whole deeply dug and the manure thoroughly mixed with the soil in digging. In the beds thus prepared the plants are placed, the collar, as they have grown in the pots, being on the surface of the beds. The 3-foot beds will receive each a row; the stakes are firmly fixed 4, 5, or 6 feet apart, according to the size of the plants; the plants themselves are planted 4 inches deep, so that the crown of the plant is just above the surface. As the plant increases in growth, tying up commences; at the same time a diligent search should be made for slugs, earwigs, and other pests of the garden. These must be rooted out, or they will root out the dahlias, or at least destroy their flower. Where any of the plants show a weak and drooping growth, time will be saved by re-striking the top; although they will bloom later, the flowers will be stronger than they would be after the plant has received a check.

983. During June and July they require careful attention in watering and stirring the soil about the roots. As the lateral shoots attain sufficient length, tie them up so as to prevent their breaking, placing other stakes for the purpose, should that be necessary. This prevents their clinging too near to the stem, and permits of a free circulation of air round the plants. When they are intended either for exhibition or for highly-developed flowers, only one bud should be left on a shoot, shading the flower both from the sun and rain by tin sconces, oil-skin caps, or inverted flowerpots, placed over the top of the stake to which it is tied, while all superfluous and useless shoots are removed, and the growth of the plant encouraged by every possible means. As the autumn approaches, the swelling shoots render it necessary to examine those tied up, slacking the strings, where necessary, to prevent them from being galled.

984. Where they are to fill a place in the general arrangement of the garden and shrubbery, care should be taken to supply them with suitable soil. Peat-mould, mixed with sand, is useful in developing stripes and spots on the flower. As the plants progress, the lateral shoots, as well as the central stem, require support by tying up, and the roots should be assisted by stirring the soil with a fork every two or three weeks, and by copious watering, removing all dead or straggling shoots, and keeping the plant trim and well-staked.

985. *Dividing the Roots.*—Another and more common practice in gardens is to place the whole tuber in some warm place in March, and, when the eyes show themselves, cut up the tubers, and in May plant them at once six inches below the surface, in the place where they are to bloom, staking them and leaving them to nature until they are sufficiently grown to compel attention; but even for common bedding-out purposes, and for filling up gaps, the plant is worthy of greater care than this amounts to. Light-coloured flowers are confirmed in their beauty by seclusion from sun and air while they are developing

their bloom. Darker flowers, on the contrary, lose much of their brilliancy if too much shaded; they should, therefore, only be shaded partially from the direct rays of the meridian sun.

986. In October, Flora's reign is almost over, and even the dahlia is about to succumb. Now is the time to revise the names, and see that they are all correct: that seed from such as it is desired to propagate from is secured before they are injured by the frost. Provide also against severe weather coming in suddenly, by drawing the earth round the stems in a conical form, which will protect the roots from frost while they are yet in a growing state, as well as diminish the moisture which encourages growth. Even in November, in mild seasons, the dahlia will remain fresh and gay if the weather is open and clear; but in general the earlier flowers will have passed away: their time of rest is come. When the frost turns their foliage brown or black, take them up, cut off the roots, leaving six inches or so of stem attached, and plunge them into a box of ashes, chaff, or sand, or any other method of preserving them from damp, frost, and heat, during the winter.

987. As to giving a list of dahlias, when it is considered that the eight or ten winners of prizes at the national dahlia-shows must exhibit upwards of 160 varieties, it will be obviously vain for us to attempt furnishing one. We may state, however, that Mr. Turner, of the Royal Nursery, Slough, has repeatedly carried off the great prizes for fifty dissimilar varieties, as well as for fancy varieties: it is pretty clear, therefore, that he can supply his customers with the very best selection possible.

§ 2.—THE HOLLYHOCK (*Althæa rosea*).

988. There is no finer ornament of the autumnal flower-garden than the Hollyhock: its noble tapering spike-like stem and rich rosettes of flowers clustering round the footstalks of the leaves, and its pannacled head and luxuriant massive leaves, render it the most effective occupant of a gap in the shrubbery, or in the back row of an herbaceous border, or even in rows in the flower-garden, or in beds by themselves, their variety of colour renders them most attractive objects. The drawback to its perfection, for many years after its first introduction, was the coarse habit of growth and the thin transparent flower-petals, which gave a flimsy appearance to its convolute flowers, and their early decay. Much of this objectionable habit has been overcome by the perseverance of the growers, and the noble plant is now produced in a manner which approximates to the properties claimed for it even by the fastidious Mr. Glenny. Under the careful hand of skilful culture, the petals have become thicker, and, consequently, the colour is more dense and decided, the centre of the flowers better defined individually, while forming a denser spike of flowers from within a foot of the ground to the summit of the stem.

989. *Propagating by Seeds.*—The seed of the hollyhock should be gathered only from the most perfect plants, in which the flowers have been round, the florets thick and smooth on the edge, the colour dense and decided,

and the flowers close to each other on the stem. About the middle of March, or not later than the first week in April, the seed-bed should be prepared, four feet wide, with an alley on each side. The soil should be rich and in good heart: such soil as would suit a cabbage will grow the hollyhock in tolerable perfection. Trench the bed two feet deep, throwing the top spit to the bottom, and bringing the second spit to the surface, if both are of the same character of loamy, somewhat tenacious soil, breaking up the surface thoroughly. On this bed, raked smooth, sow the seed so thickly as to come up an inch apart, and sift over the seeds some rich dry soil, so as to cover them for about an inch. When they come up and begin to grow, the weeds must be kept down, and vigorous growth encouraged by watering in dry weather. In June the plants will bear removal to a nursery-bed, prepared in the same manner as the seed-bed. If the seedlings have been growing vigorously, the roots will be strong, and must not be broken in taking up : this may be prevented by soaking the bed thoroughly the night previous to removal, and lifting the plants cautiously with a fork inserted under them, as in lifting potatoes. Plant them in the new bed six inches apart each way, using a dibber, making a hole large enough to receive the roots, and pressing the earth round them by making another hole on each side with the point of the dibber, watering the bed thoroughly when planted. When dry and somewhat settled, rake the bed smooth, giving the same care as to weeding and watering when dry, as well as destroying slugs, earwigs, and insects. In the autumn they will be strong plants, fit to put out where they are to bloom. If they are intended to bloom in rows where they stand, every other plant must now be removed, so as to leave them one foot apart all over the bed; here they may be supported by strong stakes placed at both ends of each row, and a strong cord carried from one to the other, to which the plants are to be tied.

990. As they come into bloom, in the second year, every single flower which does not exhibit some desirable character of habit or colour, should be thrown away before they begin to ripen seed : the majority will be in this category. Those selected for further experiment should be cut down to within three inches of the ground, the earth round them stirred with a fork, to loosen the soil and let in the air, having previously named or numbered them in your book, and described the qualities for which they were selected.

991. *Cuttings.*—As soon as the first flowers of an old plant open sufficiently to judge of the flowering, the superfluous side-branches having no flower-buds may be taken off, with two or three joints and leaves. Cut the shoot through with a clean cut, just under the lower joint, leaving the leaf entire; cut it also at about two inches above the joint: either joint will do, provided they have growing eyes, with a leaf and piece of ripened wood to support the bud until roots are formed. These cuttings, planted in a light sandy soil, placed under a hand-glass, and watered occasionally, and shaded from the sun, will require little further care except keeping clear of weeds and dead leaves. When rooted, pot them off in 60-sized pots, and put them in a cold-frame where they can remain during the winter. In spring plant them out in

the open ground, where they are to flower, the colours being arranged so as to harmonize with other parts of the garden, taking care to furnish the roots with the proper soil.

992. The old plants in autumn furnish another source for new plants. When the flowers are becoming shabby, cut the plants down, and, beginning at the bottom joints, continue to make cuttings, as described above, until the fibre gets too soft for the purpose,—each joint having eyes will furnish a plant; these struck under a hand-glass, on a very slight hotbed, will grow vigorously, the soil being gritty sand, loam, and leaf-mould, in equal proportions, watering cautiously, but sprinkling the cuttings slightly every day in fine weather.

993. Mr. W. Paul, of Cheshunt, has made the hollyhock his peculiar study, and he finds that the season of flowering may be greatly extended by striking and transplanting at different seasons. "There is," he says, "a difference of six weeks in the period of flowering between plants removed early in autumn and late in spring; and of this we may avail ourselves to lengthen the succession. Early-rooted cuttings and old plants may be induced to bloom in July, and late-rooted cuttings and spring-sown seedlings in November: hence there is no difficulty in obtaining flowers for four successive months."

994. Mr. Paul attaches much importance to a free supply of water in the spring months, when the plant has just been turned out of the pots, and when it is most desirable to have rapid and vigorous growth.

995. Three flowering-spikes should only be allowed to the strongest plants,—to weakly ones only one; all the others should be rubbed off as soon as they are sufficiently large to permit of selection. When a foot and a half high, stake them, placing two to each plant, one of these stakes being driven in on each side of the plant, the stakes being 5 feet long and driven 2½ feet into the ground. "Pass the bast round the stem of the plant," says Mr. Paul, "drawing it first to one of the stakes, and tie it;" then perform the same operation on the other side a few inches higher up, tying it in the opposite direction, "until the plant is rendered quite secure. When there are two stems to one root, three stakes will be necessary, placed in a triangle, tying the stems alternately as before," taking care, however, when planted out in the garden, that the stakes are covered with the foliage of the plant as much as possible.

996. Among the many objects of interest to be seen at Messrs. Paul's nursery, none present a finer appearance than the hollyhocks in August and September. It is the poplar among flowers. The following selection from their numerous list of plants are particularly worth notice, towering, as many of them do, with spikes ten feet high:—

White and blush-colour,—Vista; Celestial; Lady Tarlton.
Buff, fawn, and salmon,—Empress; Mr. Oakes; Queen of the Buffs.
Lemon,—Walden; Masterpiece.
Pink,—Lady Franklyn; Perfection.
Rosy carmine,—Beauty of Cheshunt; Beauty of Walden.
Crimson,—Memnon; Sir Colin Campbell; Red Rover; Waterloo.
Claret,—In Memoriam.
Purple,—Perfection.
Plum-colour,—Plutarch.
Sulphur and Yellow,—Sulphur Queen; Queen of the Yellows.

Besides these tall sorts, Messrs. Paul grow an interesting selection of dwarf sorts, comprising most of the leading colours, the plants scarcely exceeding five feet in height, the flowers very thick on the spikes from top to bottom, and with small green leaves protruding from the stem between.

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§ 3.—The Chrysanthemum.

997. Unusual importance attaches to the cultivation of Chrysanthemums, from the facility with which they may be grown in the very heart of large towns, as has been proved by the efforts of Mr. Broome in the Temple Gardens, where he has grown all the best varieties in a manner which has astonished many who have examined his collection. The flower is of easy culture, and cuttings may be struck almost up to the time of flowering, and nothing is finer than the display of its flowers in October and November, ranging as they do from pure white to a deep orange, from a pale blue to deep red and crimson ; but, like the dahlia, the first frost sadly spoils its bloom. Where the collection is a choice one, therefore, they are best trained against a wall, or in beds, where protection against sudden frost can be easily applied. By means of pot-culture, which is now extensively used, a splendid show of flowers may be preserved even up to Christmas, with comparatively little trouble.

998. Cuttings of chrysanthemums should be potted pretty thickly together in sandy soil, and the pots plunged to the rim in a gentle hotbed. If the number is not large, put each in a thumb-pot, and let it root there, so that there may be no derangement of the plants when they are repotted. Nothing roots more certainly than the chrysanthemum ; but if rooted pieces of the old plant are taken instead of cuttings, propagation will go on without any trouble at all. In order to give the plants every advantage, they must never be either root-bound or allowed to flag from drought; and these evils are to be avoided by frequent repottings and constant attention to watering. The blooming-pots should generally be 10 inches deep and 8 in diameter at the top; and between the thumb-pots and these final ones there should be at least three shiftings. Fresh rich soil must be used to fill up the space in the larger pot. Plenty of fresh air and sunlight must be afforded all through the growth of the chrysanthemum, and as it absorbs rapidly, it requires some care to prevent the leaves from flagging. In hot sunny weather, with the sun shining full on the pots, half a dozen waterings in a day would scarcely accomplish this, and prevention must be tried by burying the pots up to the rim in the moist soil of the garden : thus treated, one or two good waterings in a day will be sufficient. Care must be taken that worms do not get into the pot, by placing them on bricks, slates, or coal-ashes. They should be turned round twice a week to prevent their roots striking into the material beneath the pots. Liquid manure may be supplied rather plentifully as the flower-buds begin to expand ; when judiciously applied, it produces finer growth and deeper colour. The best compost consists of two parts light loam to one part of well-decomposed dung, freely mixed with sand.

999. The chrysanthemum, like other plants producing terminal flowers, has a tendency to send up one leading stem, which, if not interfered with, would produce a bunch of flowers at the top. This tendency is counteracted by stopping the terminal shoot, which produces a compact shrubby growth, and a great many more flowers. As a rule for the large-flowering kinds, stopping should cease in July; while with pompones it may be extended to August. The general law is, that letting the plants run up is favourable to fine flowers, and stopping, to a more plentiful supply. It is the practice of some growers to stop the plants at every third eye until the middle of August, watering freely with manure-water three or four times a week, and sprinkling the plants overhead with water every morning. Early in September the best plants are selected, and re-potted into 12-sized pots, using the compost as before, and giving ample drainage, and placing them under a south wall; the smaller plants being transplanted at the same time into 24-sized pots, and placed under an east wall. By the middle of October the earlier plants will be showing flower, and should be placed in a cold greenhouse, or cold-pit, where they can receive plenty of air, leaving those intended for late flowering under the east wall as long as the weather will permit. By the middle of November all should be housed, or at least provided with shelter, and a good supply of bloom for the next two months should be the result.

1000. *Pompones*, or Lilliputian Chrysanthemums, form a very valuable addition to this tribe of flowers. Mr. Broome says of them, "The introduction of this little favourite has tended in no small degree to resuscitate the cultivation of the chrysanthemum, which of late years has much fallen off. Beautiful, though small, it will bear any amount of looking into, yet it seems more especially designed to set off and act by way of contrast to its larger rivals, whether it be in the *parterre* or in the vases of the drawing-room." There is no difference in the method of cultivating these small varieties, so that our observations apply to both kinds. With regard to the character of the flowers of the chrysanthemum, three kinds are enumerated. The reflexed petals mark the older and less-esteemed varieties, the petals turning back towards the calyx. The incurved petals turn inward, so as to give rather a cup-like appearance to the flower. The anemone-flowered chrysanthemums have a centre of short compact petals, arranged in a globose form, around which the larger petals radiate. They are very beautiful, but it is somewhat difficult to get them to bloom perfectly. The following is a list of really good sorts:—

Large Varieties.—Louisa lucidum; Madame Léo; Vesta,—white: Aimée Terrière; Eugénie; Hermione; King,—blush and pale pink: Admirable; Baron Scalebert; Phidias; Léon Leguay,—rose and lilac: Grand Napoleon; Progné; Rantonette,—rose and carmine: Changeable,—yellow: Cloth of Gold; Gold Queen of England; Persanne,—yellow: Agustie Mie; Madame Poggi; Pluton; Lothario,—red and crimson: Alcibiade; Cassy; Poudre d'Or; Ruth; Zephyr,—bronze and orange.

Large Anemone-flowered.—Eclipse; Reine Marguerite,—yellow: Fleur de Marie; Madame Sentir; Nancy de Sermet,—white: George's Land,—red, with yellow centre: Louis,—lilac: Marguerite d'Anjou,—nankeen.

Pompones.—Berrol; Ida; Solfaterre,—yellow: Bijou de l'Horticulture; Cedo Nulli; Nelly,—white: Duke de Rouen; La Promise; Président Decaisne,—rose: Attila; Marceau; Surprise; Zebra,—pink and lilac: Mustapha; Pandore; Sainte Thais,—bronze and orange.

§ 4.—AUTUMNAL ROSES.

1001. Among the ornaments of the garden, however, none approach the queen of flowers, the rose, which is no longer a summer flower only; for we have autumnal bloomers, surpassing in colour, beauty, and fragrance all the flowers of the garden. Conceive the dazzling beauty of a bed of Géants des Batailles, or a clump of Baronne Prevost, La Reine, or some masses of Mrs. Bosanquet or Eliza Sauvage, and compare their fragrance with any other autumn-flowering plant with which the beds, clumps, and parterres are occupied.

1002. The soil suited to the rose is a loamy clay, rather stiff than otherwise; but it should be enriched with some strong, well-decomposed animal manure. Where the natural soil is light and sandy, therefore, the whole bed should be removed to the depth of two feet, and replaced with the richest natural fibrous loam at hand, thoroughly mixed with decomposed dung. In the beds thus prepared, always presuming them to be thoroughly drained, roses may be planted at distances proportioned to their size and habit, and whether they are intended for pegging down all over the bed, or as bushes. The stronger sorts, if to be pegged down, should be about two feet apart each way, and 2½ to 3 feet if intended for dwarf bushes, according to their habit.

1003. The few select roses in the following list require little pruning; the more delicate-growing ones require to have the head regulated in the winter, and all dead wood cut out; the stronger plants should have grosser shoots taken out at the same season, and the heads regulated by shortening the others. In summer, all strong shoots showing no buds should have the points pinched out to encourage side-shoots, and when bloom is over, each shoot which has borne a flower should be cut back nearly to the next well-developed bud, giving at the same time abundance of liquid manure.

Hybrid Roses blooming from July to November.

Baronne Prevost,—bright rose-colour; large flower, free grower; suited for a large clump.

Géant des Batailles,—dazzling crimson; nearly scarlet, free grower, and abundant bloomer on to December.

La Reine Brillante,—glossy rose; very large, robust grower, and free bloomer.

Madame Laffay,—bright crimson, very fragrant; free grower and bloomer on to December, and admirable for a clump.

Bourbons.

Bouquet de Flore,—bright crimson, opening freely, and blooming profusely from June till November.

Count d'Eu,—brilliant carmine, suitable for bedding out; blooming through the summer and autumn.

Queen,—fawn-colour, shaded with salmon; an early and late bloomer, dwarf in habit, and lovely in clumps; and remarkably sweet-scented.

Souvenir de Malmaison,—white, with fawn-coloured centre; a large and free-growing flower, blooming through summer and autumn.

China Roses.

Mrs. Bosanquet,—creamy-white; a profuse bloomer from June to November; a beautiful rose.

Clara Sylvain,—pure white, blooming freely from June to October; suited for a small bed.

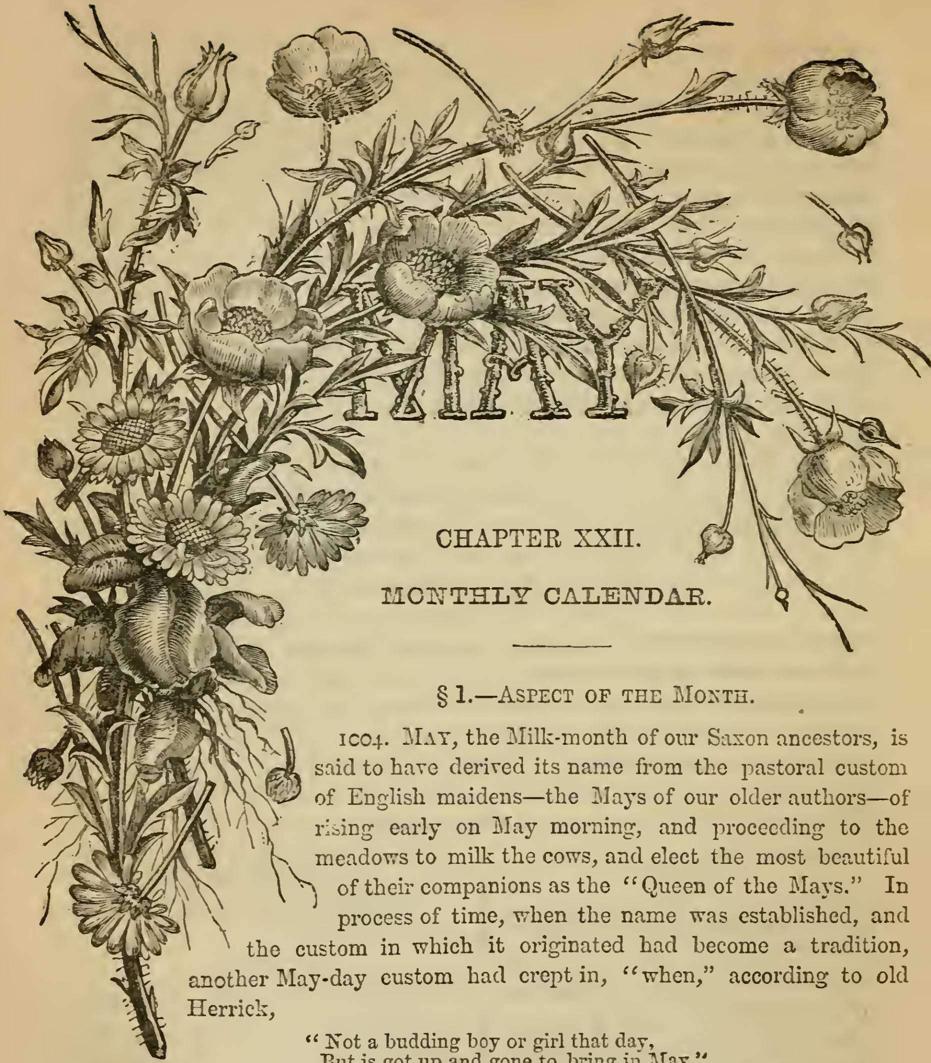
Eugène Beauharnois,—bright lake; a free bloomer through summer and autumn; very hardy.

Tea-scented Roses.

Adam,—rosy-blush; a large magnificent camellia-like rose, only requiring protection in winter.

Devoniensis,—creamy-white, with buff centre; fragrant as well as beautiful, and admirably adapted for a clump.

Eliza Sauvage,—cream-colour, with deep orange centre, of delicate dwarf habit; and the best yellow for bedding out.



CHAPTER XXII.

MONTHLY CALENDAR.

§ 1.—ASPECT OF THE MONTH.

1004. MAY, the Milk-month of our Saxon ancestors, is said to have derived its name from the pastoral custom of English maidens—the Mays of our older authors—of rising early on May morning, and proceeding to the meadows to milk the cows, and elect the most beautiful of their companions as the "Queen of the Mays." In process of time, when the name was established, and the custom in which it originated had become a tradition, another May-day custom had crept in, "when," according to old Herrick,

> "Not a budding boy or girl that day,
> But is got up and gone to bring in May."

May, however, so poetical in the origin of its name, is one of doubt as to its true season: is it the first month of summer or the last month of spring? It probably rests between the two seasons. It is certainly the month when the renovated earth appears again "in its peculiar honours clad." Its mean temperature, on an average of years, is higher; but it still ranges from 33° to 70°, and severe frosty nights are by no means uncommon. It is, however, very nearly the driest month of tho year, although warm sunny showers are also frequent, and under their balmy influence the garden now displays itself, decked in its gayest attire. The tall and shapely Asphodel, or

Jacob's rod, the double red Pæony, the pride of many a rustic beau, now bursts into bloom, while the rose-coloured double white varieties open their more delicate blossoms. The Mountain or Tree Pæony, from the distant Chinese mountains, once rare, and a fertile subject of gardening controversy, is now by no means uncommon. The milk-white balls of the Guelder Rose, the Lilac, and all the magnificent American plants, are now glowing in the fulness of their beauty.

> "Laburnums rich
> In streaming gold, syringas ivory pure,
> The scentless and the scented rose,—this red,
> And of a humble growth,—the other tall,
> Her silver globes light as the foaming surf;
> The lilacs—various in array,—now white,
> Now sanguine; the beauteous head now set
> With purple trusses pyramidal."

1005. Nor are the more lowly flowers, "native to the soil," less lovely even in the parterre: the lily of the valley, which art has taught how to retain its bloom far into summer, is always lovely, and the marigold, the "golden flower" of older poets, whose

> "Winking, May-buddes begin
> To ope their golden eyes."

1006. Nor are the other regions of Nature still in this lively month: the groves are now harmonious and musical; the skylark hovers in the air, and the "shrub-loving" nightingale is now heard in the dale.

> "Up this green woodland path we'll softly rove,
> And list the nightingale—she dwelleth here."

1007. All the orchis tribes native to our woods are now in full bloom; the saxifrages belong to this month, and the "May" itself, which has become impersonated, as it were, and, as is often done, cause and effect confounded, for the sake of sound and sense, as it is when the dying heroine of the plaintive ballad is made to exclaim,—I'm to be Queen of the May."

1008. The woods and hedgerows will be found highly productive in native flowers this month; the Ranunculaceæ and the Cruciferæ, the Veronicas, Violas, Euphorbias, and Wild Geraniums, are now in full blossom; the air resounds with the hum of bees, and the groves re-echo with another feathered favourite. We have listened to the nightingale,—hark to another,—Cuckoo! Cuckoo!—

> "Ah! well I know thy note;—
> That far-off sound the backward years doth bring;
> Like mem'ry's lock'd-up bark, once more afloat,
> It carries one away to life's glad spring,
> To distant home, with all its green boughs rustling."

1009. The average temperature of the month is nearly ten degrees above April, but it presents even an increased variation in its extremes of heat and cold, which renders it very dangerous to the tender flowers and fruits of spring, which now, in consequence, require increased care in protecting them from cold frosty nights, and shading from the sun's heat. The maximum average of heat in May for the ten years ending in 1853 was 65·36°, the minimum 41·73°, and the average mean 53·54°.

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§ 2.—FLOWER-GARDEN AND SHRUBBERY.

1010. *The Flower-Garden.*—A flower-garden is only interesting as a whole when the beds are distinctly seen; any gradations, therefore, produced by mere colouring and shading in one bed by plants closely approaching each other in the colour of the flowers, and perhaps height too, is lost, because the eye gets entangled by one colour after the other, and the whole effect is a series of impressions so slight as to be scarcely felt—the shades of difference are too minute for effect. If you would leave a pleasing and lasting impression, therefore, plant your flower-beds with decided colours, and leave to Nature the task of shading them off.

1011. When autumn-planting has not been effected, Portugal laurels, evergreen oaks, red cedars, arbor-vitæ, &c. &c., and hollies, have been found to take root more freely now than when planted earlier in the spring. Continue to prick off annuals raised in frames into small pots, and harden such as are established preparatory to their turning out into the open ground. Those which have been potted some time should have another shift, rather than allow them to become stunted in their pots. Another sowing of annuals may now be made either in an open border for transplanting, or on small squares of turf, grassy side downwards. When the plants are up, the pieces of turf with the plants may be removed to their final quarters. As the planting season approaches, have everything ready by hardening the plants, that they may experience no check by removal, and turning over and well working the soil to get it into a proper state for planting.

1012. Large plants of some genera, as phloxes, asters, &c., generally throw up too many flowering-shoots: where such is the case, thin them out at once, so as to obtain not only fine heads of bloom but increased strength to the remaining shoots, to enable them to need less assistance from stakes. Hollyhocks for late blooming may still be planted, as it is better, where they are grown extensively, to plant at two or three times to insure a succession of bloom. As the soil and weather will now be in a fit state to commence bedding out, a start should be made with the half-hardy plants first; as antirrhinums, pentstemons, &c., which may be followed by calceolarias and verbenas; reserving heliotropes, and the more tender kinds of geraniums, for the latest planting. One of the principal points in pleasure-ground scenery is the beauty of the turf, which should be kept at all times well cut, but more particularly when, by cutting the grass as low as possible, the foundation of a close-bottomed turf will be laid for the season. On poor sandy or rocky soil, the verdure must be maintained by occasional waterings with liquid manures, or dressings with guano, leaf-mould, or decayed dung.

1013. Where bedding-out is practised, this is a busy month; let all be done according to a well-digested plan, in which the height and distance, as well as the colour of every plant and every bed, are previously determined; for the next few weeks will be devoted to filling up the flower-garden beds and clumps intended for the summer and autumn display. Every exertion should be made to get the planting-out completed with all possible despatch; and, premising the plants intended for each bed have been previously determined and hardened off, no great difficulty will now be met with in filling them up. If an early display is wanted, they must be planted rather thicker, and need not be stopped; if not before a later period in the summer, plant somewhat thinner; and the flower-buds should be pinched off as they appear, till the plants have filled the beds.

1014. Select a shady border, and give it a good dressing of rotten dung or leaf-soil; slightly fork in for planting with the runners of the different kinds of violets for forcing. The Neapolitan is the best for frames or pots, and the runners will now be found in a proper state for removing: plant them 8 or 10 inches apart, water them abundantly in dry weather, and pinch off the runners as they appear: if the soil is rich and open, they will grow into stout bushy plants by the autumn, and may then either be potted or planted into pits for forcing.

1015. Stake or peg down such plants as require it, as the planting proceeds, or the wind will break many things off. Plant out in rich soil a good supply of stocks and asters for the autumn; and sow a succession of annuals for making up any vacancies which may occur, and likewise another sowing of mignonette in pots for rooms or for filling window-boxes.

1016. *Bulbous Roots and Tubers* intended for removal should be taken up as their leaves decay. Even those which are usually left in the ground should be taken up every two or three years, and their offsets, which will have grown into large bunches, should be separated, if large and handsome flowers are desired. When the offsets are detached from the principal bulb, it is desirable to give it a season of rest. This treatment is necessary for all bulbs. The principal one, planted in its season, flowers with renewed vigour; and the offsets, in time, form new plants. The proper time for removing the various narcissuses, jonquils, irises, tulips, and hyacinths, and all other bulbs, is the season when the leaves and stems begin to decay; for then the roots are in a state of rest: if left in the ground three or four weeks later, they put forth fibres and buds for the following year's bloom, thus wasting their strength fruitlessly.

1017. *Tender Annuals,* such as cockscombs, balsamines, amaranthus, egg-plants, and others, wanted early or in large plants, should now be shifted to another hotbed previously prepared for them, either on the surface of the ground or in a trench of the size of the frame. When ready, plunge the pot into the soil, cover the bottom with the proper drainage, and half-fill it with fresh compost; then take the plant from the old pot with its ball of earth, and place it in the centre, filling it in all round with fresh earth to within half an inch of the top, and water moderately. When the lights are put on, tilt them a little for ventilation, and to let the steam escape, and shade from the noonday sun. As the plants increase in height, raise the frame a little: many expedients for doing so will readily present themselves to a thinking man.

1018. *Half-hardy Annuals* for beds and borders should now be planted out in the ground, others potted or pricked out on a slight hotbed; and those pricked out last month will now be fit to transplant, having been gradually inured to the open air; for this purpose let them be taken up with the roots entire, and carefully planted with their ball of earth in the places where they are to remain. Ten-week stocks, mignonette, and China-asters, may still be sown in a bed or border of rich ground; but a gentle hotbed will bring them forward so as to flower a fortnight earlier.

1019. *Hardy Annuals.*—Lupines, Flos Adonis, lychnis, mignonette, and many others, may still be sown in beds or patches where they are to flower, watering them after sowing and in dry weather. Perennials may now be increased by cuttings of the young flower-stalks; double scarlet lychnis will grow freely so propagated. Divide the young flower-stalks into lengths, each having three or four joints, and plant them in a shady border of rich light earth about four inches asunder, two joints of the cuttings being in the ground: press the earth round the stem, and water them moderately, covering them with hand-glasses, and shading from the midday sun. All the fibrous-rooted plants may be increased by this method, as well as by separating the roots, the only methods by which the properties of the double-flowering species can be propagated. Wallflowers can now be propagated by seeds as wells as slips. *Tuberoses* planted now will bloom in autumn if the pots are plunged in a hotbed: they require no water till the roots begin to push, when they should be watered every second day. All seedling perennials and biennials should now be planted out if sufficiently advanced; the others pricked out in nursery-beds. Dig up a piece of clean ground for this purpose, and divide it into beds 3½ feet broad; rake level before planting, and prick the plants out by line six inches apart each way. Seeds of gillyflowers, wallflowers, sweetwilliams, Canterbury bells, and most other sorts, may still be sown in beds of mellow ground not too much exposed to the sun.

1020. *Grass Lawn and Gravel Walks* should now be kept in high order, the grass well mown once a week if possible, and kept clean and orderly; gravel walks kept free from weeds, and well swept and frequently rolled, especially after heavy rains; borders, beds, and shrubberies free from weeds, and where vacancies in the beds occur, let them be supplied; let the earth be clean and well raked, and the edgings, whether of turf or box, be kept in perfect order.

1021. *Florists' Flowers.*—Hyacinths and tulips, ranunculuses and anemones, formerly the glory of our garden, are now in full bloom; and although the roses, fuchsias, and a thousand rivals, contend with them for pre-eminence, they have still their phalanx of admirers. The more valuable hyacinths and tulips are planted in beds defended by hoops, which, in hailstorms and heavy frosts, are covered with mats. These protecting coverings are now only kept at hand ready to throw on when their shelter is required either from the sun or from sudden showers and hailstorms. By this means the blooming season for these gems of the flower-garden may be prolonged for a fortnight or three weeks, and their brilliancy increased.

1022. When these choice bulbs are past flowering, and the leaves begin to decay, let the roots be taken up and spread out to dry and harden, in some dry shady place for a fortnight or three weeks; the roots trimmed, cleaned, and deposited upon shelves or in boxes, till required for replanting in autumn. Others recommend that the bulbs should be recommitted to the earth, not planted out, but placed on their sides in a bed of dry soil, and the roots covered for two or three weeks, during which the moisture of the bulbs will gradually exhale, and the bulbs dry and harden without shrivelling or rotting. From this bed they are removed in a dry day, the stalk-leaves trimmed off, and the bulb well cleaned, then spread out in a dry shady place till perfectly dry, when they are put away till required.

1023. Spring crocus, snowdrops, crown imperials, and all other flowering bulbs, should also be taken up when the leaves decay. It should especially be practised in the case of bulbs which have remained in the ground two or three years and increased by offsets into large bunches. These offsets are detached from the principal stem, and each planted separately. The larger roots, planted again, bloom the following year, and offshoots will probably bloom the year after. This month, or the following, it will be proper to remove the autumn-flowering bulbs, such as the colchicums and autumnal crocus, which have now ceased to grow. All these removals must be made in dry weather, and the offsets carefully separated, and either planted again immediately, or spread out to dry, and stored till August, when they are to be planted again.

1024. *Dahlias* potted off last month, and hardened by exposure, may be planted out about the third week. If the pots are getting too small for the growing plants, it is better to re-pot them in larger pots than to plant out too early.

1025. *Auriculas* going out of bloom should be placed in a shady place, if in pots, and receive shade from the sun, if in beds.

1026. *Carnations* and *Picotees* in pots should at this time have every assistance given them; sticks should be placed to support the stalks towards the end of the month, the plants watered in dry weather and kept clean, the soil occasionally stirred, and kept free from dead leaves, and a sprinkling of fine fresh soil added occasionally. All the side-stalks rising from the stem should be taken off, leaving none but the top buds; shading the pots from the mid-day sun. Pinks, as well as carnations and picotees in beds, require the same treatment.

1027. *Pansies* may be planted for successional beds in a north border, in which spring seedlings may be used. Plants in bloom should be shaded at noon in sunny days, and well watered in the evenings. Blooms not required for seed should be cut off as they fade, and side-shoots taken off and struck.

1028. *Ranunculuses* should have the soil pressed round the collar and watered when the soil becomes too dry.

1029. *Tulips* beginning to show colour should be shaded by an awning or otherwise, but not too soon; neither should it remain after the sun has begun to decline. Watering round the beds will keep them cool, and protract the blooming season.

1030. *Phloxes*, whether in pots or beds, should be watered occasionally with liquid manure.

§ 3.—Mixed Flower and Kitchen Garden.

1031. In the mixed garden, the flower-beds will probably be occupied to a large extent with permanent herbaceous plants or bulbs; for it is not to be supposed that either labour or money will be available to keep up an entire system of seasonal bedding-out here. Where there happens to be a south wall looking towards the house, in such a garden there is no place more suitable for a clump of American plants. Rhododendrons, azaleas, kalmias, and daphnes, were long supposed to require bog-earth for their culture; but they are now found to bloom well in a stiff clay; and such a soil, with a moderate amount of bog, and brick and lime rubbish, is found admirably adapted for their growth. Where there is a west or south border under a wall available for flowers, let it be thoroughly drained, and the primitive soil dug out to the depth of two feet, and mixed with sandy loam and leaf-mould and a little well-decomposed manure, and then replaced in the border. Some of the finest tea-scented and other roses may be planted in it, choosing such as will bear frequent thinning and pruning, because on this depends their continuous and profuse bloom.

1032. There are also among the culinary plants of the present day some which are capable of being used with ornamental effect, from their variety of colour and elegance of foliage. The purple-leaved Atriplex, for instance, forms an agreeable contrast with the green leaves of their vegetable products. The yellow beet, with rose-coloured stalks, is very striking from its prominent broad coloured veins. The balsam cucumber, most of the gourds (*Cucumis citrellus*), might be allowed to trail over the ground in ridges, or up the trunks of old trees in graceful festoons. Some of the cabbages even, as the early greenish or the red-streaked sorts, are admirably adapted for purposes of decoration. The curly-streaked cabbage (the *chou frisé pinaché*) is beautifully tinted with delicate rose-colour; and it is a matter of surprise that these elegant varieties are so seldom seen in our gardens. Again, there is no plant more interesting than some of the rhubarbs. All of these may occupy a portion of the mixed garden with advantage.

1033. *Rock-work.*—Few ornaments of a garden have a better effect than rock-work properly disposed; while at the same time it is also very useful. By means of it, not unfrequently, an ugly corner may be turned to very good account, and very many plants will be found to flourish and do well upon rock-work which can hardly be kept alive elsewhere. Sometimes, when the garden or pleasure-ground is very extensive, a piece of rock-work may appear to be needed on its own account, to form a break in the scene; in which case it will be desirable that the work be constructed of the stone of the country, to give to it as natural an appearance as possible; but, in a general way, for rock-work which is intended to be covered with plants, any material that comes most readily to hand may be made use of. The flint stones from the chalk and marl pits, where they can be had, form excellent rock-work; and so, of course, do the different spars of Devonshire and Derbyshire also. As a general rule, rock-work should never be raised on grass, but on gravel, or on a concrete foundation. It is also well placed around a pond or water-tank. In the centre of a square gravelled plot, a tall piece of rock-work is a very pleasing object.

1034. It may be constructed by using the roots of old trees piled one upon another as a basis, which should be well covered with a good coating of fine loam. On this the stones may be built up, in any form that good taste may suggest, interstices, with more or less of surface, being left, which will in this way form beds for the different plants. The spring of the year is the best season for making rock-work, since the soil will have time to settle, and the stones to become fixed in their position before the next winter's frost. Almost every county in England has some material natural to it from which rock-work can be formed,—even the larger stones of the gravel-pits may be used for this purpose; and, in the absence of anything else, blistered clay from the brick-yards and clinkers from the smith's furnaces are not to be rejected. The sea-shore, also, all along the coast affords plenty of material out of which a little taste and good judgment will soon arrange something both agreeable to the eye and useful as a bed for many different classes of plants. On the tall piece of rock-work which has just been described, may be planted almost every variety of hardy or half-hardy creepers,—lophospermums, Maurandya canariensis, the different sorts of periwinkle, &c. &c.; while lower down, between the stones, cistuses, saxifrages, and sedums may be grown. The wild sedums of our different counties form most interesting collections when placed by themselves in a separate piece of rock-work; and so also do the wild ferns. The writer of these remarks has formed on a piece of rock-work under a north wall in his garden, what is to himself a most interesting collection of seventeen or eighteen different varieties of ferns, gathered with his own hands in different places in the county of Norfolk. Many other counties in England are much richer in these natural beauties, which, when arranged in rock-work as county collections, will well repay any one for the time and trouble spent in searching for them.

1035. *Pegs for Bedding-plants.*—Various expedients are resorted to by gardeners to peg down the different sorts of bedding-plants,—verbenas, petunias, &c. &c. Some use ladies' hair-pins, and some use small pegs made of hazel or other wood; but the neatest, the cheapest, and most efficient pegs which have come under the writer's notice, are cut from the brake, a wild fern which grows freely in every lane and on almost every common in England. Many a poor boy might earn an honest penny by cutting these in autumn when the wood is tough, and selling them in bundles for next summer's use.

1036. *Hints on Clipping Hedges and Evergreens.*—All evergreens and hedges, especially evergreen hedges, should be cut to a point pyramidically; for if the top be allowed to overhang the bottom, the lower shoots will invariably die off. With hollies and laurels use the knife in pruning, to avoid the rusty appearance of the withering of half-cut leaves. Privet and thorn may be clipped with the garden-shears.

1037. *Treatment of Bulbs in Borders.*—Be careful to give a good dressing of well-rotted manure, and as much mulching from the liquid-manure tank as can be spared to all choice bulbs while their leaves are in a growing state; for it is at this time that Nature is making her greatest efforts, and will require, of course, the greatest support. Those who wish to increase the size of any single bulb, and so insure an extra fine flower for another year, will do well to cut off the flower-stalk as soon as it appears this season; but by no means to pluck or injure the leaves. In the case of all bulbs, the leaves should be suffered to die away naturally, notwithstanding the beds where they grow are not improved in appearance while the process is going on. In crocuses and narcissus for edgings the dying leaves may be curled round and made neat; but they must on no account be shortened or cut off. Nothing in the spring of the year makes a more effective display in a garden than different sorts of bulbs round the edges of the different beds, now of necessity empty of everything else. Yellow, purple, white, and variegated crocuses, may each have its own edging of a bed allotted to it—the little single daffodil, the winter snow-flake, and hoop-petticoat narcissus, may be placed around others; but if these are to flourish and do well, they must not be disturbed; they must be well manured when in a growing state, and their leaves not removed until they have died down.

1038. *Liquid-manure Tank.*—In anticipation of a hot dry summer, every garden should be provided with a liquid-manure tank, and this may be easily and inexpensively made of an old tar-barrel either standing on the surface or sunk into the ground. The barrel should be filled about one-third with well-rotted cowdung and two-thirds pond or rain water, and occasionally stirred. As the liquid is used up, more water may be placed upon the sediment, which, as it becomes exhausted, can be replenished from the cow-yard and the stable-drain.

1039. *Tomato, or Love-apple.*—An admirable sauce by itself,—it enters largely into a great number of our best and most wholesome sauces. It also may be cooked and brought on to table like other vegetables in several different ways. Moreover, those who have analyzed its properties say that the tomato is singularly wholesome, and very useful, especially in cases of bad digestion: still it is not appreciated or cultivated as it ought to be. There is undoubtedly some little difficulty in our climate in fruiting and ripening tomatoes to perfection; but the following directions, if attended to, will generally be found to succeed:—Sow the seeds in pots in very rich light mould in March or April, and place them in a cucumber-frame, or other gentle heat. When the second leaf appears, re-pot the plants either singly or at most two or three together, keeping them near the glass and well watered. In May remove them to a cold-frame for the purpose of hardening them before they are planted out, which should be done as soon as the fear of spring frosts is over, and the earlier the better. The best situation for tomato-plants is against a south wall, fully exposed to the sun. The plants should be well watered with liquid manure to keep up a rapid growth. As soon as the blossom-buds appear, watering should cease. Stop the shoots by nipping off the tops, and throw out all those sprays that show little signs of fruit, exposing the young fruit as much as possible to the sun and air, only watering to prevent a check in case of very severe drought, of which the state of the plant will be the best index. In a very dull, wet, cold autumn, even with the greatest care, the fruit will sometimes not ripen as it ought; but in this case it may frequently be made fit for use by cutting off the branches on which full-grown fruit is found, and hanging them in a warm dry greenhouse or elsewhere, to soften and ripen: a cool oven may be used advantageously to effect this.

1040. *Scarlet Runners.*—Scarlet runners may be planted at any time in April or May. The seed should be dropped about four inches apart, and if a line be selected along the two sides of a walk in the kitchen-garden, a very pretty shady avenue may be made. Plant stakes seven or eight feet high in the row where the beans are; set two or three stakes to the yard, and bend them over at the top to form arches. In the spaces between the stakes place pea-sticks, to which the runners may at first be trained. The stakes should also be tied together by wands arranged longitudinally, one along the top, and one halfway up each side. When this framework becomes covered with scarlet runners, a very pleasant shady walk will be formed. With a little care in manuring and watering, the runners may be kept green and in bearing till killed by the autumn frosts. The runners will blossom and bear much more freely if the old beans are all removed, and they are not allowed to ripen seed. A mixture of the white Dutch runner with the scarlet runner gives to the avenue a very pretty effect.

§ 4.—The Pea.

1041. *Pisum sativum* of Linnæus is too well known to require any description; its origin is lost in its antiquity, for Pliny only alludes to it as being known to the Greeks, while two kinds, he tells us, are grown in Egypt,—one round and black, the other having a peculiar shape "all its own." These two sorts, which are probably the field pea and the garden pea, have multiplied until the list of the nurseryman numbers the varieties by hundreds. It is distinguished in botanical language by its three pair of ovate leaves, entire, undulating at the edge, and marginate, carried on a common cylindrical petiole; its great oval stipula nearly heart-shaped, marginal, and its flowers, two or many, of mixed white and red colour. Of the pea cultivated in gardens, the varieties have become so numerous, and so many have been re-named for trivial variations, that it has been found necessary, both in this country and in France, to classify them according to some well-defined characteristic. M. Vilmorin, in "Le Bon Jardinier," divides them into podded and skinless, or *mange-tout* peas; each of these divisions, however, containing both dwarf and tall sorts, requiring sticks, as well as late and early kinds. We are without any test for comparison, except in one or two instances; but we select a few as examples of the sorts encouraged by our French neighbours.

I. *Dwarf Podded Peas.*
  1. Early dwarf,—18 to 20 inches; the best early pea, alike proper for the frame and open ground; its flowers rise from the second or third joint, which distinguishes it from all others. The pod is rather small, and the peas good, without being remarkable.
  2. A very early-frame variety grown by M. Gouthier is the smallest and earliest pea in cultivation in France; it is 16 centimètres high (about 8 inches), an excellent bearer, the pod containing five peas.

II. *Tall Podded Peas.*—Our early-frame occupies the first place in this division, under the synonyme Mechaux de Hollande. *Prince Albert* is smaller and less productive, but a few days earlier. *Early Charlton* is also a favourite, under the synonymes Mechaux pois de Paris, and Pois de Neuilly, and the tall white marrow, as the Pois de Marly.

III. *Skinless Peas.*—Pois sans parchemin, or mange-tout, are scarcely known with us. In France, nine varieties are cultivated. The best, perhaps, of the eat-alls, says M. Vilmorin, is the pois blanc à grandes cosses; its pod is large, broad, fleshy, and crooked,—a quality which has procured for it the name of the ram's-horn. It grows very tall, and is very productive in good soil, and requires sticking. The giant skinless (pois géant sans parchemin) is also remarkable for the size of its pods, is extensively cultivated round Paris as a market pea.

1042. In 1835, the Royal Horticultural Society employed Mr. Gordon to report upon all the varieties of the pea grown in the gardens at Chiswick. In his report, he divides them into nine classes, as follows:—

I. *Common Dwarf Peas.*—With small roundish pods, white peas, and stems not exceeding 3 feet.

II. *Common Tall Peas.*—With round pods, white peas, and stems requiring sticks.

III. *Dwarf Marrow Peas.*—With broad peas, particularly sweet when young, and stems not more than 4 feet high.

IV. *Tall Marrowfats.*—Like the last, but with stems requiring sticks.

V. *Sugar Peas.*—With pods destitute of the usual tough lining, and eaten like kidney-bean pods; the peas white.

VI. *Imperial Peas.*—With the strong growth of the marrows and the small round peas of the Prussians.

VII. *Prussian Peas.*—With the stems branching very much, and roundish, not very large pods; the latest of any class.

VIII. *Grey Sugar Peas.*—With pods like those of the fifth class, but with flowers of a purplish colour, and peas spotted, or any colour but white.

IX. *Grey Common Peas.*—With purple or white flowers, and peas any colour but white, the whole of the class being field-peas.

1043. The results of Mr. Gordon's experiment was a selection of about forty varieties, many of which had numerous synonymes. Out of the whole, he recommends early frame, early Charlton, and Duvergne, as the best sorts for early sowing, belong to Class II.; Knight's dwarf marrow, in Class III.; Knight's tall marrow, tall green marrow, the crown pea, and the branching marrow, in Class IV., for late sowing. Among the sugar peas, not to be sown before March, he recommends early May, the large crooked Vilmorin's sugar and new tamarind class. And among dwarf blues, for summer use, the best were found to be dwarf imperials, Class VI.; blue Prussians, white Prussians, and Groom's superb dwarf blue, Class VII.

1044. A further experiment was undertaken in 1850, under the direction of Mr. Thomson, when 235 varieties of seeds were sown at the same time and under the same circumstances. Out of this number he selected twenty-seven sorts. These he reduces to eleven varieties, which he recommends for general use. These are:—

1. Prince Albert,—a white pea, which he classes with Early Kent, Early Hesse, Early Warwick, and Early May, as synonymes for Early Frame.
2. D'Auvergne,—already described.
3. Dumas' Monastery,—a white pea, 4½ ft.; a good second crop pea, of medium size.
4. Bishop's New Long-pod,—an abundant bearer, 2 ft. high, producing a succession of pods, and valuable for small gardens.
5. Fairbairn's Surprise,—a profitable pea for second crop, 5½ ft. high, pods thick, round, with seven to nine bluish peas.
6. Victoria Marrow,—an excellent pea for principal crop, 5½ feet high, pods 4 inches, in pairs, with seven to eight large bluish peas; one of the best bearers.
7. Bedman's Imperial,—a very prolific pea, 3 ft. high; a large bluish pea, excellent for green-pea soup.
8. Flack's New Large Victory,—much like the last.
9. Knight's Tall Marrow,—already described.
10. Fairbairn's Champion,—a fine wrinkled pea, 5 to 6 ft. high, seven and eight large bluish-green peas, and very early.
11. Knight's Dwarf Marrow,—a large bluish green pea, six in a pod, 3 to 4 feet high, sugary, and excellent flavour.

1045. Subsequent experiments, and criticism upon them, leave the question as follows:—

1046. *Early Peas.*—Essex champion, Warner's early emperor, Warner's early conqueror, early Bedalian, early railway, and the early wonder, may be considered as identical. Warner's early emperor is stronger and taller than the early Kent, not quite so early; but a few days earlier than the early May. Danecroft rival, Danecroft early green, Tarne's Conservative green marrow, and the transparent pea, are the same.

1047. *Late Peas.*—Of fifteen varieties (so called by the seedsmen), the following appear to be the best, as proved in the Horticultural Society's Garden: American dwarf, sown April 6, fit for use July 8; about a foot and a half in height, a good bearer, ripening about ten days later than Bishop's long-pod. Stubbs's or Burbridge's eclipse, sown April 6, fit for use July 12; a good dwarf for its season, having the peas larger than any other variety equally dwarf. Hunter's new marrow, sown April 6, fit for use July 18; larger than Knight's dwarf marrow, and of very sugary quality; a good bearer. Hair's dwarf green mammoth marrow, 2½ feet high, sown March 11, in full flower June 24; six peas in a pod, of large size and full flavour; first gathering July 10; the most prolific and best. In some experiments undertaken by Mr. McIntosh at Dalkeith Palace, he reports the blue Prussian, early Charlton, and one or two of the old sorts, as unsurpassed, and adds to the list, as excellent sorts:—

British Queen,—4 to 5 ft.; pods large, seven very large peas, sometimes a single one 1¼ inch circumference.

Hair's Defiance, Knight's Marrow,—4 ft.; should be planted 4 to 6 inches apart in rows, and 4-foot rows; a large profitable pea, and long-bearing.

Tall Crooked Sugar Skinless Pea, with great pod,—a rambling sort.

Sutton's Early Goliath,—a large-pod pea, resembling Knight's Marrow, 4 ft. high.

1048. *Veitch's Perfection*, a pea out since these experiments were made, has a high reputation ;—said to be a delicious pea, a prolific bearer, producing a fine deep green pod of large-sized peas,—rarely less than eleven.

1049. The pea, without being difficult as to the quality of soil, does best on a rich light loam, and nothing seems to agree so well with it as a fresh virgin soil, which has not been cropped for some years before. For early crops, as we have seen, Early Frame, Early Dwarf, Blue Prussians, and Knight's Marrows, are good sorts. They are usually sown in double rows, that is, two rows nine inches apart, and each pair of rows from 3 to 5 feet apart, according to the height of the sort; and for the very tall sorts, even 6 feet apart. They should be sown in drills three inches deep, and all on the same level, and moderately thick, so as to allow for the depredation of the feathered races. It is usual, where ground is valuable, and the rows run from north to south, to fill the space between the rows with cabbages, onions, French beans, and other surface-crops. The French gardeners sometimes plant the peas in clusters, by making holes 8 or 10 inches apart in the rows, and planting in each five or six peas.

1050. The subsequent culture consists in hoeing and earthing-up the young peas when an inch or two above the ground, and watering in dry weather; and, except in the case of the dwarf sorts, sticking them as soon as they begin to throw out their lateral shoots, choosing sticks with spreading branches, on which the vines may extend themselves.

1051. The production of peas in autumn requires considerable attention, especially on light porous soils, and even on soils which produce good spring and summer crops. By the following process, Mr. Middlemas produces fine crops of peas till October. Manure and trench a piece of ground in the ordinary way ; and make a trench 9 inches deep and 15 inches wide; a coating of cow-dung six inches thick is forked into the trench, and covered with a few inches of soil—upon this soil the peas are sown. Late in the season and in dry weather, soak the peas for a day or two in water before sowing ; but for early crops, or in moist weather, the precaution is unnecessary.

1052. The best seed-peas are Warner's Emperor or Hair's Mammoth Marrow ; they will rise 5 and 6 feet high under such treatment, and yield splendid crops; but as they grow more vigorously under this treatment, so they require more space between the rows, and thinner sowing, with a copious watering in dry weather. When in full bearing, a thorough soaking with liquid manure or a sprinkling of guano over the trenches, and a copious watering with soft water afterwards, will not be thrown away. A row each of Knight's Dwarf Marrow, Fairbairn's Champion, Hair's Mammoth, and Bishop's Long-podded, sown every month until August, will give a plentiful supply and good succession throughout the season. Plants sown in August, in pots filled with rich manure, planted out on a south border previously trenched and well manured, the whole ground being thoroughly soaked with weak manure-water, and mulched several inches thick with well-rotted dung, will yield an excellent crop through October.

§ 5.—The Fruit-Garden.

1053. As the health as well as the symmetry of the trees depends in some degree on judicious and timely disbudding and stopping, nothing should interfere with their performance this month, bearing in mind, that as peaches, nectarines, and cherries, bear their fruit on shoots of last year's growth, new wood, both present and prospective, is absolutely required. If these operations are properly done now, and to a sufficient extent, any extensive use of knife and saw may be dispensed with. Weak trees will be strengthened, and fruitfulness promoted in vigorous ones, by summer-pruning; and the outward sign of good management is exhibited in trees equally balanced both as to their young wood and fruit-bearing branches. Any departure from this equilibrium must be remedied by one or other of the expedients already described. Remove all fore-right and misplaced shoots, unless there is fruit at the base, when they should be stopped, only leaving two or three leaves. Thin the fruit slightly, if crowded. At the end of the month all protection may be abandoned. If insects infest the trees, wash with soap-suds from the laundry, or soft soap prepared for the purpose, and syringe with tobacco-water: a little flour of sulphur added is a preventive of mildew.

1054. *Apricots.*—Stop all leading shoots, and pinch off to a few buds all shoots not required to fill up vacant places on the wall. Thin partially all fruit where it is thickly set, but reserve the final thinning until the fruit has stoned. The apricot, and especially the finest of them (the Moor Park), is subject to a sudden paralysis, in which first a branch, then a side, dies away, until scarce a vestige of the tree is left; and this generally occurs on fine sunny days in spring and early summer, when the sap-vessels are young, and the sap easily exuded by a few sunny days. In this state a frost occurs, the sap-vessels are burst by the thawing of the frozen fluid, and the whole economy of the plant deranged. Under these circumstances a warm sunny day occurs; the injured limb having consumed the sap, can draw no further supply; it yields to the solar influence, languishes, and dies. Such is briefly Mr. Henry Bailey's diagnosis of the disease under which this delicate tree suffers. The remedy is to retard, or rather prevent, premature vegetation, and when that can no more be done, protection; for which he recommends netting made of sedge, of about 4-inch mesh, with which he envelops the main branches with a favourable result.

1055. Towards the middle of the month all wall-trees should be carefully inspected. Where it is necessary to remove nets or other shelter to accomplish this, they should be kept ready at hand, and in order for being replaced, should any indications of low temperature or spring frosts show themselves. The object is now to search for insects and disbud superfluous shoots, especially where the trees are old and walls indifferent. This can only be accomplished by examining them tree by tree and branch by branch. In this search, all decaying branches must be cut back to a healthy bud, all discoloured and unhealthy leaves, and all dead blossoms removed; nails and shreds in the way of young wood loosened and placed in a more accommodating place, and the leaves and branches well syringed with soapy water. Should any appearance of the fly or scale present itself on the leaves, they should be hand-washed and sponged with tobacco-water or some other composition, and the whole syringed with clean tepid water. This will give even clean and healthy trees a healthier appearance. The fruit, which will now be of some size, thus cleared from all decayed or decaying matter, will have a fresh and healthy appearance.

1056. The object of disbudding is to remove all useless spray not required for next year's branches, or which would not, from its position, ripen into desirable fruit-bearing wood; it is, in fact, to relieve the tree from nursing wood that must be cut away in the autumn-pruning; but it must be the care of the operator to avoid removing well-placed shoots for future branches, or which would expose the tree to too severe a trial of its vital power.

1057. *Apples, Pears, Plums,* and *Cherries,* on walls or espaliers, should also be divested of all useless wood during this month, and the useful shoots trained in, regularly removing all shoots produced in front of the trees close to the stem. In summer-pruning, leave side-shoots in different parts convenient for training for the production of future fruit-bearing spurs. By stopping these side-shoots when they are a few inches long, the trees, whether espalier, dwarf, or wall-trees, will be brought into a moderate state of growth favourable for the production of fruit, with less use of the knife.

1058. *Strawberries.*—Towards the end of the month lay clean straw or fern between the plants to keep the fruit clean and prevent evaporation; water the plants copiously in dry weather while in flower, and remove all runners not required for propagation.

§ 6.—KITCHEN-GARDEN.

1059. *Asparagus.*—New plantations of asparagus may still be made, but it must be well watered, unless rain occurs. Sow asparagus-seed where it is to grow, and thin the plants to the proper distance. Beds that are in bearing should be kept clear of weeds, and the ground stirred occasionally, adding a sprinkling of salt, which improves the flavour. In cutting, use a rough-edged knife, and insert it close to the head to be cut, to avoid cutting others in the process.

1060. *Artichokes.*—Stir the earth well about them, and reduce the shoots to three, and draw the earth well about the roots. The offsets taken off may be planted in threes, four feet apart one way and five another, giving a copious watering till they have taken root.

1061. *Seakale* should be cleared of the litter used in forcing, and the ground forked between the rows, keeping it clear of weeds till the following December, unless the season should prove a dry one, when one or two copious waterings should be given, especially to newly-raised plants, the roots of which are yet shallow. If the leaves are used, they must not be thinned too much.

1062. *Rhubarb* roots may yet be divided and planted four feet apart : it is a good practice also to sow the seed, which may be done at this time. Sow broadcast, and leave the plants till the following spring, so as to judge of the earliest, so that thinning is unnecessary till this is ascertained. Roots for forcing may be raised thus in abundance.

1063. *Horseradish.*—Pinch out the tops where running to seed, and use the hoe freely all the season through—it will require little other attention the rest of the season.

1064. *Beans* may still be sown; about the end of this month some will be in full bloom ; pinch out the tops of such, to hasten the setting of the flowers.

1065. *Celery.*—Prick out that sown in March, giving six inches' distance from plant to plant: in order that they may get strong, let plenty of good rotten manure be worked into the soil. An excellent plan is to cover a hard surface with four inches of rotten dung, over this three inches of soil, which having trodden and raked even, prick out the young plants the same distance apart, and water plentifully; they will form a mass of fibres, and may be cut out with a trowel for planting in the trenches. A little shade will benefit them in sunny weather.

1066. *Cardoons* may be treated in a similar manner; but may yet be sown—they will grow large enough for every purpose : there is no advantage in having them over large.

1067. *French Beans.*—These may be sown plentifully this month ; they will be found exceedingly useful, as they follow the main crops of peas, and are both delicate and wholesome. Sow in drills three inches deep and three feet apart. Earth-up those that have made a pair of rough leaves, after thinning to four or five inches. These should have no manure, as that is likely to make them run all to haulm.

1068. *Runner Beans* may be sown this month: being of a climbing habit and very quick growth, they must have plenty of room. Sow in rows seven feet apart, or sow 10 or 12 feet from row to row, which will allow of planting ridge cucumbers between : drill them in four or six inches deep, or dib them in clusters or circles, of five or six beans in each cluster; these being six feet apart, they may be grown with fewer sticks, and look more natural. The Giant White, the Case-knife, and other varieties, have all the same habit; but that most usually grown is the Scarlet Runner, which is, I believe, unsurpassed either for flavour or productiveness.

1069. *Nasturtions* are often grown as salad, and also for the seeds, which in the young state are useful for pickling. Sow in drills, the same as peas; or they are ornamental as covering for rustic fences, hurdles, &c.

1070. *Peas.*—To sow now, use such sorts as Knight's Dwarf and Tall Marrows, Mammoth, or British Queen, in good soils, or even in poor soils, if mulched with good sound manure the latter sort yields immensely. Observe the same rule in sowing these as in scarlet runners, as regards distance. Earth-up and stick any that may be advancing, as they grow quicker now than in former months: this must be done in time, or they will fall over. Dwarf sorts will not require sticks, and are very useful in some localities.

1071. *Carrots* that are advancing should have the small hoe employed between them, as nothing benefits these more than continually stirring the surface of the soil: thin them to the proper distance. Fresh sowings may still be made. *Horn Carrot* sown now will be very useful in the autumn, and should be sown thicker than larger sorts.

1072. *Onions* may still be sown, more particularly for salading, for which purpose thin out the earliest sowings and clear from weeds: drenching the soil with liquid manure occasionally will benefit these. Give a dredging with soot occasionally.

1073. *Leeks.*—Thin where forward enough, and plant the thinnings a foot apart, in rows two feet from each other; give liquid manure to those that remain, and stir the ground between.

1074. *Parsnips.*—Thin out to a foot apart at least—18 inches is not too much.

1075. *Potatoes.*—Continue to plant if desirable: no fear need be entertained of their doing well. Several good late sorts do as well planted this month as earlier. Earth-up those that are forward enough, but not too much: more earth than is just sufficient to cover the tubers is likely to prove injurious to the crop.

1076. *Turnips* may do well sown now, if wet or showery weather occur: sow broadcast, tread the seed in, and rake soot in with it. This seed germinates very quickly at this time, especially if sown on fresh-dug ground. Such as are up should be hoed between and thinned out immediately: doing this early will be of great advantage to the crop—the oftener it is done the better.

1077. *Scorzoneras, Salsafy,* and *Hamburg Parsley* may still be sown, the treatment of these being very much the same. Sow in drills 15 or 18 inches apart, and thin to about nine inches when up. Their culture is very simple, merely requiring the hoe between them during the summer. It is as well not to give manure before sowing.

1078. *Lettuce.*—Sow in drills, a foot or rather more at this time of the year, especially on light ground: let as many as possible continue where sown. Those transplanted had better be in drills, for the greater facility of watering, an abundance of which they must have in dry weather, to insure crispness and milky flavour that indicates a well-grown lettuce. The soil for these cannot be too rich. The large-heading kinds of cabbage-lettuce are proper to sow this month, but cos lettuces do equally well. Tie up cos lettuce about a fortnight before using, as directed in January.

1079. *Endive.*—The Batavian may be sown now: it may be useful to use in the same manner as spinach: treat in the same way as lettuce.

1080. *Beet.*—Sow the white as a substitute for spinach, and also silver beet to be used as seakale: treat same as the red.

1081. *Rampion.*—Sow broadcast or in drills, and thin to about 10 inches.

This being a very small seed, the ground should be raked over before sowing, to prevent the seed getting buried too deeply: tread it in, and rake afterwards.

1082. *Spinach* may be sown now; but as it is apt to run very quickly, it is advisable to sow on a north border. Give plenty of room: it is less likely to run than when crowded.

1083. *Chervil* and *Parsley* sown now on a sunny border will be useful in winter. Sow either in drills or broadcast; tread the seed in before raking; thin out that which is sufficiently advanced to nine inches; plant out the thinnings to the same distance—they are said to curl better when planted out.

1084. *Radishes.*—Sow for succession. These must be well protected from birds, as they are immoderately fond of pulling them up as they begin to grow. They must be well watered, to prevent their becoming hot and woody. A good retentive soil suits them best at this time.

1085. *Cress.*—American, Normandy, and Australian cress, and Corn-salad, to come in in August, should be sown now in shallow drills or broadcast, treading the seed firmly in before raking: these also will require copious waterings.

1086. *Cabbage.*—To hasten the hearting of those that have stood the winter, tie them in the same way as lettuce. Plant out early-sown ones, and sow again for succession.

1087. *Cauve Trouchuda* is much esteemed in some families for the midrib of the leaf, which is used as seakale. Treat as directed for Brussels sprouts, &c. All the members of this group like a retentive soil, highly enriched with manure; but the latter is best given in the form of mulch. They then fibre on the surface of the ground and grow luxuriantly.

1088. *Brussels Sprouts* and *Borecole* may yet be sown, treat in the same manner as broccoli.

1089. *Savoys.*—This useful vegetable may yet be sown, since moderately-sized heads of good colour are better than large white ones—the result of too early sowing. The main point in their culture, in common with the rest of this group, is an open situation and plenty of room,—two feet each way is none too much; they must also receive their final planting before they are drawn up in the seed-bed.

1090. *Cauliflower.*—Plant out early-sown 18 inches apart. Those that have stood the winter should have liquid manure, or, at least, plenty of water, unless they were previously mulched, which prevents evaporation, and also feeds the plants. Break the centre leaves over any that may be heading.

1091. *Broccoli.*—This being a good time for sowing late sorts, as Purple Sprouting, Miller's Dwarf, &c., care should be taken to have a good supply of them: they are invaluable in the early spring time. Give them an open situation; sow broadcast, each sort separately, and rather thinly. Walcheren sown now will be very useful in the autumn: plant out early sorts that are large enough before they get shanky.

1092. *Herbs,* as Balm, Mint, Marjoram, Savory, Thyme, &c., may be increased by slips, offsets, or divisions of the roots: at this time they grow quickly after the operation: they must be well watered.

1093. Other herbs, as Basil, potted Marjoram, Fennel, Dill, &c., may be sown on the open ground. They are not generally subject to the attacks of birds, as many other seeds are.

§ 7.—FLOWER-CULTURE UNDER GLASS.

1094. *Conservatory.*—A watchful eye must now be kept on all house plants for insects, or the labours of months, perhaps even years, will be lost. Ply the syringe diligently upon all plants not in actual bloom, to keep away the red spider; wash off the scale with soft soap, and fumigate for aphis and thrips. Where fumigation is only necessary for a few plants only, perhaps they can be removed to a close room and subjected to that process.

1095. The occupants of the greenhouse are now being transferred, rendering the conservatory gay and lively. Roses will be coming forward from the forcing-houses. Camellias, their season of bloom being past, are now in their full growth, and will be benefitted by being shaded from the bright sunshine. An application of weak manure-water will now be of great use to them if the surface-soil is getting dry,

1096. The Camellia is, perhaps, the most beautiful flowering shrub which enters the conservatory; its dark glossy leaves are beyond description magnificent when well-grown, and are almost as attractive as the plant in flower. Every year the collections are enriched with some new variety which surpasses its predecessors; but it is also important to preserve the few old favourites, by inarching them on strong, vigorous plants, bearing inferior sorts, a process which is best performed while both are in vigorous growth after flowering. According to Mr. Glenny, a perfect camellia should be round in outline, the petals smooth on the edges, and thick and firm in texture; each row of petals should rise sufficiently above the other to form a globular face; and, as a consequence, perfect symmetry, uniformity, and order should pervade the plant. In order to secure these points, the plant should be grown bushy and short-jointed, shrubby, and with foliage compact, and close down to the rim of the pot; the blooms encouraged at the end of the shoots fairly beyond the foliage, which should conceal the stems and present a bright surface of dark green.

1097. By a little management now, that universal favourite the Lily of the Valley may be retarded in its bloom till June. Keep the pots perfectly dry and in a cool shady place until their natural season is past: by watering they soon come into foliage and flower, welcome in their vestal white among the dazzling and gay-coloured flowers in June.

1098. Climbers must now be attended to, kept from confusion, and neatly trained, and the house kept thoroughly ventilated and moist.

1099. Azaleas as they go out of bloom should be attended to, the old flowers and seed-vessels picked off. Should they require re-potting, it should be done when the new growth begins; the strong shoots of young plants stopped, except one, to form a centre for a tall pyramidal-shaped plant, the best form for this beautiful tribe of flowering plants.

1100. *Pelargoniums* trussing up for flowering require particular attention: tie out the shoots as far apart as possible, to admit air freely to the heart of the plant, keeping the pot covered to its rim with foliage: give liquid manure two or three times a week, and fumigate for protection from the green-fly: give all the ventilation possible, and water sufficiently to prevent the lower foliage losing colour.

1101. *Scarlet Geraniums* should be encouraged to grow by liberal shifting, and when established, water freely, giving liquid manure to those fully rooted. Stop those growing freely, that they may become compact and bushy plants.

1102. *Fuchsias,* shrubby Calceolarias, Heliotropes, and Alonsoas, like the geraniums, require liberal shifting in order to grow them properly. Select strong plants of either, and shift them into a sufficiently large pot filled with a good rich compost, and, if convenient, place them in a gentle bottom-heat. Shade them from the sun, and syringe occasionally, to keep up a moist atmosphere. If they are required to be large plants, pinch out the first flower-buds and place stakes a foot higher than the plants, to tie them to as they grow. When well established, give liquid manure and ample ventilation during the day; but shut up early to promote vigorous growth. Pick off all decayed leaves from calceolarias and other shrubs, and peg down, to furnish the surface of the pots.

§ 8.—FRUIT-CULTURE UNDER GLASS.

1103. The great enemies of fruit-forcing are insects. Strict watch must now be kept for the red spider; if allowed to establish itself on the vines now beginning to ripen their fruit, it will seriously compromise next year's crop. The thrip is a still more insidious enemy, and its destruction is both difficult and expensive. On large-leaved plants, such as the vine, if not very numerous, it may be kept down by carefully washing the infected leaves with weak tobacco-water, using a soft sponge for the purpose, that the leaves may not be injured; but on peaches, strawberries, and even when numerous on the vine, nothing will serve to destroy them but repeated fumigations with tobacco. The brown scale is sometimes troublesome to peaches, and should be brushed off with a small painter's brush dipped in strong soap-suds; but this pest seldom occurs if the proper dressing were applied to the trees before forcing. French beans, strawberries, and the like, must be removed from houses occupied by other crops as early as possible, as they are generally the means of introducing some of these pests.

1104. *Vinery.*—The earlier crops now coming forward will be colouring, when they must be kept perfectly dry, and have as much air as can be given safely, keeping the house at the temperature of 65° or thereabouts. The most important part of the vine's growth is between the breaking and the setting of the fruit: for the formation of sound, healthy wood and perfect bunches, they should be assisted by artificial means during that stage of their growth. Hamburgs, and the more hardy grapes, will require to be kept near 65° as a night temperature as they approach the time of flowering; but the Cannon-Hall and the common Muscat, the Damascus and West's St. Peter's, will require an additional 5° as they get into bloom; and this heat should be maintained till the berries are wholly set, when a slight diminution of temperature may take place, according to the time when the crop is wanted. Regulate the growing vines so as to keep them as evenly balanced as possible. To effect this, keep the lower spurs on a par with the upper ones, and allow them to grow for some time before they are stopped: this will help to counteract the flow of sap upwards, and to balance the growth of the tree.

1105. Thinning, stopping, and tying-in should now be done daily, watering freely, and some sorts with more delicate foliage require shading for a few hours about noon. About the middle or end of the month remove any fermenting material which may have been left on the borders of the early houses, and give a dressing of decayed turf or rotten dung, spreading it over the surface to preserve the roots. When the grapes in the early house are cut, great care should be taken to preserve the foliage in a healthy condition for the next three months, by frequent syringing, to keep down the red spider, which the dry air of the house during the ripening of the fruit will have encouraged. The success of next season's crop will mainly depend on this after-treatment. If the foliage is unhealthy, or the vines weakly, and new wood is required to furnish healthy leaves, the growth should be stopped when three or four joints are formed. Abundance of air and light are indispensable auxiliaries. Keep the houses containing grapes ripe or ripening very dry, and admit air liberally.

1106. *Vines in Pots.*—Where it is intended to grow vines in pots, select the necessary plants now; those raised from last year's eyes being best for forcing. Cut them down and pot them in 12- or 14-inch pots, using a compost composed of good turfy loam, mixed with a little rotted dung. Place them in a cool house or pit to break; afterwards place them in a house where they can be trained near to the glass.

1107. *Pinery.*—Keep the atmosphere of the swelling fruit humid, and the earth about the roots moderately moist, using occasionally weak manure-water. Where extra heavy fruit is desired, all suckers should be removed as they appear. On warm afternoons syringe copiously, and close up with a temperature of 90°, giving air again towards evening. When there are indications of changing colour, withhold water, and see that the bottom-heat is kept steady at about 85°. The plants intended for autumn-fruiting should now be shifted into their fruiting-pots. The best pines for swelling their fruit in winter are the smooth-leaved Cayenne and the Black Jamaica, with a few Queens. To insure these showing fruit within the next two months, it will be necessary either to remove them into a house with a drier atmosphere, or to apply it to them where they are growing. They should now have filled their pots with roots, and should have larger pots without delay. Let the pots be large enough to allow a good portion of turfy loam round the ball; pot them firmly, and rather deeper than the previous potting. On plunging them afresh, allow them considerably more room, and bring them near the glass. Pines planted out in open beds must also have the roots kept in a moist state by waterings, which at this period may be given overhead, provided the pits are closed up at a high temperature.

1108. *Peach-House.*—The fruit on trees put forward in December will now be approaching maturity, and the house should be kept rather dry, giving all the air possible. At this stage they will bear forcing freely; keep, however, the syringe at work twice or thrice daily; tie in the shoots as they advance, and expose the fruit to the free action of light, if a high colour is wanted. In the succession-house the borders should be kept well watered. British Queens are very subject to red spider: to keep this down, ply the syringe well till they are in bloom after the fruit is set; the inside walls of the house should be washed with a sulphur mixture. The fruit of the "Queens" will require some kind of support, owing to the length of the footstalk. That the ripening fruit may enjoy all the advantages of light and air, tie close in the shoots intervening between the trellis and the glass, and take off any leaves shading the fruit from the sun. Give air freely to peaches during their last stage, to improve the colour and flavour, and allow them plenty of time to ripen, which will improve both their size and appearance. A net should be suspended loosely underneath the trees before the crop is ripe, to collect any fruit which may get overlooked in gathering.

1109. *Figs* will now be ripening, and in this stage watering should be discontinued, as it injures the flavour of the fruit. When in tubs, however, and a second crop is coming on, manure-water should be given in moderation.

1110. *Melons* now swelling will require a moderate amount of water; if the plants are growing in mere loam, liquid manure should be given. Be particular that the bottom is maintained at a steady point: a deficiency or excess of heat at this stage would most materially interfere with the swelling of the fruit. To preserve the soil in a medium state of dryness, and to save frequent waterings, the surface of the bed may be covered with common flat tiles or broken brickbats. Great attention must be paid to preserve the principal leaves from injury. The fruit of plants growing on trellises should be placed on a thin piece of board suspended under the plants. After the fruit is three parts swelled, a fresh growth may be permitted if the plants are intended to produce a second crop.

1111. *Orchard-House* — Ventilation must still be strictly attended to. Open all ventilators during the day, except in fierce north and east winds. Worsted netting of ½-inch mesh may be placed over the ventilators with advantage in severe weather. If the caterpillar attacks the young shoots of the apricot, the ends must be pinched off and crushed. Summer-pruning of trees to be so treated to commence early this month. In pyramids, apricots, as soon as the shoots have made six or seven leaves, must have the sixth leaf with the end of the shoot pinched or cut off with a penknife, leaving only five main leaves. From this leading shoot two or three will break: in like manner when they break, all but one of these is to be pinched down to five leaves. When this one has made ten leaves, pinch down to nine. With pyramidal peaches and nectarines, as soon as the shoot has made three leaves, pinch off the third leaf with the end of the shoot, leaving two principal ones. These pinched shoots will soon put forth fresh shoots, which, with all succeeding ones, must be pinched off to one leaf as soon as three are formed.

§ 9.—Hotbed and Frame Cultivation.

1112. Hotbeds may still be made for starting cucumbers and melons with greater certainty of obtaining fruit, and also with far less labour and material than formerly, the weather being much warmer, and the sun aiding by his rays the efforts of the cultivator; but the same directions apply now as before for making the beds, excepting that they need not be quite so high—three feet or rather more will be sufficient. Beware of building hotbeds with long or insufficiently-prepared dung: the violence with which it ferments will destroy the plants or lay the foundation of a weak, sickly growth, accompanied by mildew and other pests. Great caution is necessary, because over-heating is more likely to occur, and is less easily detected now than in colder weather. Wait a week, or even two, rather than build with insufficiently-prepared dung. Sow the seed and raise the plants as already directed, and treat in nearly all respects in the manner described. Shading will be necessary for newly-removed plants, if the sun is powerful; but plants can be re-potted, or planted in such a manner that they do not in the least miss the moving: let the pots be thoroughly clean before using them, and the plants will turn out without breaking the ball of earth, or disturbing the roots. Give plenty of air to growing plants, particularly in sunny weather. Neither cucumbers nor melons should be shaded—it is necessary that the stems be matured and ripened, in order to secure a good bearing condition: plants that are vigorous and healthy will bear the full light of the sun, if air is admitted proportioned to its influence. Attend well to pinching back under-growth, and pegging down the stems: they will root at every joint by so doing, and continue bearing much longer. Water must be given more freely as the weather gets warmer; but see that the plants are not chilled, which will be the case if the water is not of a temperature nearly equal to that of the bed. Shut up about 4 or 5 p.m., and open as early in the morning as the weather will permit, and water before closing in preference to other times; as during the night the plants revel in a moist, dewy atmosphere. The principal summer crop of melons should be got out this month; and here the ordinary melon-pit will be brought into requisition. Let a good quantity of well-prepared dung be ready: the pit should be about four feet deep in front, rising at an angle of 45°, or thereabouts, of the most simple construction,—no other appliances being necessary; but it should be broad and roomy, both on account of holding sufficient dung to maintain a lasting heat, and also that the plants may have sufficient room to trail; but they must not be allowed to ramble at pleasure. Keep them within bounds by stopping and pinching; let the dung be thrown in evenly, and worked about with the fork, so that it may not sink more in one place than another; allow it to settle; throw on six or eight inches of good loamy soil, which tread over. When of the right temperature (about 80°) the plants may be put in, settled with warm water, and afterwards watered about twice a week, but not overhead when about setting the fruit: stir the soil and pour it between the roots at that time. Bees will find their way into pits and frames at this time of the year, and fertilize the fruit-blossoms, although some growers, to make doubly sure, still perform that task. Melons in full growth must have plenty of fresh air to insure that dark healthy greenness in the foliage indicative of vigour in these plants. Close before the air cools too much, and open in the morning before the steam shows on the glass: both are important, because, if the lights are left open late, the air inside is chilled, and rendered unsuited for healthy respiration; whereas, in the morning, if kept closed too long, the plants sweat, and are less able to bear the sunlight. I consider shading unnecessary, except in case of fresh planting: if properly treated in other respects, they will be able to bear the sun's rays.

1113. Cucumbers and melons may be grown under hand-glasses, if managed in some such method as the following. The plants are supposed to be raised in March or April, and potted singly or in pairs, and kept growing till the beginning of this month; a trench is marked out, four feet wide, and dug out to the depth of 15 or 18 inches, throwing the earth equally on each side; then throw in dung which has been previously prepared, sufficient to form a bed at least three feet deep; on this throw a hill of soil (if good garden soil, that thrown out of the trench will do) at intervals of four feet from each other. The only reason for making small hills of eight inches high or so, is to avoid the rapid sinking consequent upon adding too great a weight all at once, which would cause a proportionate rise in temperature, a circumstance to be avoided, because the greater the heat the sooner it is over. Place hand-glasses one on each hill (those with iron frames and portable tops are best) when the rank heat has passed, put in the plants, two under each hand-glass, and shade if necessary. When the fibres begin to appear through the soil, add more earth till the whole is level. The heat is maintained by placing more dung, first on one side and then on the other. By that time the weather will be sufficiently warm to keep them growing. As they begin to trail, lift the lights on bricks, on inverted flowerpots, before they run any length. It is advisable to mulch with light litter: watering will be sometimes necessary; but it should be administered warm, and not too often; stopping and pinching must also be attended to. If several ridges are ranged together, leaving four feet clear between, this can be filled in with proper dung, and the whole levelled for the plants to trail on.

1114. Vegetable marrows and gaurels may be planted in somewhat the same manner, if done before the last week in this month; but let the bed be broader, and not quite so high, placing about a foot of soil on it; all that is necessary is a slight heat to start them, and covering with handlights.

1115. Frame potatoes, carrots, cauliflowers, &c. will be fit for the table this month, and may be replaced by any of the above, taking out the old soil and replacing it with fresh, and applying new linings. Such are also very useful for growing capsicums and tomatoes, either for fruiting or merely preparatorily to planting them under a wall: in either case, they should be grown in pots. They may be used for other tender annuals: celosias and cockscombs always do best when plunged in heat, and grown in a frame or shallow pit.

1116. Frames are also excellent for hardening off all sorts of bedding-stock for the flower-garden; the lights can be pulled quite off, and the plants are thus inured gradually to the open air.

§ 10.—COTTAGE GARDENS.

1117. Cottage gardens may, and often do, look exceedingly pretty, because, being on a small scale, they are completely under control, more so than large gardens, which rarely receive an amount of attention proportioned to what the cottager may bestow on his few square rods. The law of proportion is applicable to garden matters as to other things: a small garden may be made a perfect picture of neatness and gaiety, whereas in larger gardens, unless there is plenty of labour, the gardener is always doing, and nothing ever appears to be done. This ought to reconcile many who dream of the wonders of floral skill they would display had they more space. Cottage gardens being on a limited scale, the object should be to make the most of what they have. Old worn-out shrubs, trees, or plants, should be discarded. Not a foot of valuable space should be occupied by anything that is not either useful or ornamental. Clear the ground of all such, and then ascertain what subjects will best repay, with real enjoyment, the labour and expense of planting. But first of all, is the plan or shape to your liking? If not, set about altering it. The planning of gardens admits of variations as numerous as designing for shawl-patterns. However that may be, let every small garden present one predominating feature; let it be either shrubbery, lawn, geometric flower-beds, or rockery; this will give a distinct and withal an attractive appearance, which it would not otherwise possess; at the same time everything should be proportioned to the place. Cottage gardens may be made to look neat and attractive by merely laying down the centre with grass, and cutting flower-beds of various shapes on it, the grass lawn being surrounded by a gravel walk, the whole skirted with a border next to the inclosure. The form and style of the garden must in a great measure depend on the aspect, the situation, and the nature of the inclosure. For instance, if much overshadowed by trees, few deciduous shrubs would pay for planting, while most kinds of evergreen shrubs would thrive and be in good keeping. Grass gets drawn up or dies off and seldom gives satisfaction when shaded; but to many other plants such a situation is the natural habitat. Ferns grow naturally in the woods. Many sorts of herbaceous plants also feel quite at home so shaded. Anemones, Arums, Hypericums, Sedums, Saxifrages, Primulas, and various bulbous-rooted plants, as Crocuses, Galanthus, Ornithogalums, Narcissus, are among these. It is thus quite necessary to ascertain, before laying out money on plants, that they are adapted to the situation. In a north aspect most of the above will thrive, and, if clear overhead, most of the deciduous flowering plants also will do well; but as a rule, bright-flowering plants prefer a sunny aspect, although in the summer time flowers last much longer in the shade. Again, something is due to the nature of the soil. In a good retentive loam, plants will bear the fiercest rays of the sun without injury, and most of the rhododendrons and other American plants will do well. If the soil be loose and porous, a continuous application of water will scarcely keep them in health. As a general rule, wherever grass gives a short, close, lively, and verdurous appearance, almost any plants will grow satisfactorily. In arranging a small garden, one particular class of plants should predominate. Avoid a crowded and heterogeneous mixture of habits and characters in plants, and give each individual plant room to grow. In a small compass, if roses are planted, let them have a fair chance, by giving them plenty of space, light, and air. The queen of flowers deserves the first place, from its beauty and fragrance, but others have their merits. Rhododendrons, planted either in a mass or singly, are splendid objects in the flowering season. The hardy hybrids are best for general purposes, they being ornamental as evergreens, besides the beauty and variety of the flowers. Hardy azaleas also produce a fine effect when planted in masses ; both these and rhododendrons do best when planted in peat-earth ; but they do very well on a stiff clay subsoil, with proper stations for the plants—should be sunk a trifle lower than the level of the garden, and they require a deal of water from the time of blooming till they have set their buds for the next season. The object in sinking the bed is to give water more effectively. Choice hollyhocks, herbaceous plants, ferns, pansies, tulips, dahlias, in clumps or beds, when tastefully arranged, are all admissible ; but in small gardens a few plants, or even one kind well grown, are better than a host of indifferently-grown plants. It is this separate growing of particular plants that originates superiority in the culture of each ; and although exclusiveness in this respect ought not to be carried to excess, it nevertheless gives a greater interest than when the attention is divided amongst a great variety.

1118. Arranging flowers in small gardens being a matter of taste, must be left to the proprietor. Our object is to give such general directions as may assist the amateur in carrying out his particular views. In planting beds with half-hardy plants, which is usually done about the latter end of May, the plants should be in a condition to start into flower. Much time is lost by planting small or late-struck plants. In arranging them, the most brilliant effect is produced by massing ; every bed being planted with one distinct class,

—one with verbenas, another with geraniums,—and these, again, arranged according to their various colours, either in groups or ribbons, with due regard to height.

Verbenas are very much of the same habit and height; but a very fine effect is produced by planting beds entirely with them, they combining all colours but yellow.

Geraniums are much the same, but vary in height. Thus, Little David is very dwarf; Tom Thumb, rather taller; Punch Queen (perpetual), taller still. The Zonale, or horseshoe-leaved, are mostly of tall habit; Cerise and pink-flowering sorts are generally dwarf.

Calceolarias embrace all shades of yellow and orange: some are very dwarf, as *aurea floribunda;* others are taller, but rarely exceed 18 inches in one season.

Blue Lobelias are all of very dwarf habit, and are very effective for frontage, being continuous bloomers.

Cupheas grow about 8 or 10 inches high.

Petunias are much the same in habit as verbenas, being dwarf and trailing: this tribe embraces many colours.

Heliotropes are mostly of lilac colour, but some are darker: they are mostly dwarf and spreading; but they are chiefly valued for their perfume.

Lantanas are much the same in habit, growing about 15 inches high.

Ageratums grow still taller, and some are variegated: all these, and many others of a like nature, may be raised from cuttings in heat, in February and March, and hardened off in frames before planting; or they may be struck from cuttings in July and August, and wintered in a greenhouse, pit, or even in a window, it being merely necessary to guard against frost and damp.

1119. In planting a border, the ribbon-style is very effective,—that is, supposing there be room for five or six rows, each row a foot or 18 inches wide,—a double row of Lobelia speciosa next the edging, followed by a row of verbenas,—Mrs. Holford's Snowflake, or any other white sort; these, again, followed by Calceolaria aurea; this by Tom Thumb geranium. If there is room for one or more rows, they may be followed by Salvia patens (blue), Coreopsis lanceolata (yellow), a row of white phlox, and a back row of dahlias These should graduate in height and colour. This is merely given as a sample of what might be done. However, there are many things that would do, in the same way, as Kœnigia variegata. Isotomas, Phlox Drummondii, are all dwarf, and suitable for front row; Petunias, Heliotropes, Lantanas, &c., might form a second; Ageratums, Galardias, Salvias, might form a third. Again, Mirabilis, still taller; then dahlias, and hollyhocks, tallest of all. Or ribbons are very effective planted with annuals, as Phlox Drummondii, stocks, asters, Zinnias, Xeranthemums, and sweet peas, all which graduate in height, and vary in colour. These may be raised in frames in March and planted out in May, or sown in the open ground in May. Hardy annuals may be sown early in spring, and be allowed to flower; and then followed by bedding-plants or by biennials, which are best sown in May and planted out. Hardy herbaceous plants alone may keep a border perpetually gay, but are not well suited for massing. They should, however, be arranged with regard to height and colour. Pansies, daisies, primroses, selines, &c., being dwarf; pinks, cloves, carnations, veronicas, &c., taller; phloxes, various sorts of campanulas, chrysanthemums, &c., and starworts, Rubeckkias, &c., being tallest of all. This class of plants flower at various times of the year, from early spring to late in the autumn. Where spring-flowering bulbs are mixed up with them, it is not advisable to plant them near the edge, as is often practised. Plant them far back; as they flower when the borders are comparatively bare, they are sure to be seen to advantage; and the long grassy leaves do not disfigure the borders after they have flowered, as they do in the old method. Late bulbs, as Gladiolus and lilies, being tall, should be placed far enough back to correspond with the other plants. Very pretty effects may be produced by planting a ribbon border or clump with plants of ornamental foliage. These look better, if neatly managed, than most people would imagine. It may also be done with the very commonest and cheapest of plants; for instance, a front row of variegated arabis, which is a very common hardy herbaceous plant; second row, Henderson's beet, treated as an annual. This is a dwarf, and very bright crimson-coloured sort, and grows about 8 or 10 inches high; third row, Antenaria, or variegated mint—hardy; fourth row, Perilla nankinensis—annual; fifth row, ribbon-grass—hardy; sixth row, purple Arack, Atriplex rubra—annual. These graduate in height and colour, and have a very pretty effect, and last the whole summer and autumn.

§ 11.—Window-Gardening.

1120. Many window-plants will be in full bloom at this time; and to preserve their freshness as long as possible, give plenty of fresh air; and though a little sun morning and afternoon is beneficial, still too much is likely to produce a contrary effect, and cause them to fade long before they would do with timely and judicious shading. If the plants are in ordinary pots, which are certainly best, let them be plunged in ornamental pots or vases, and fill up the vacancy between with moss or sand: they will not only look better, but the roots, being kept cool, will keep the moisture longer, and less watering will be necessary. This is of some consequence in a room; for although watering will be sometimes necessary, means should be taken to reduce the quantity required, by shading, plunging, and keeping the pots in feeders—that is, pans or saucers, which are made to match with the pots or vases; but this requires a little judgment: it will never do to let the roots of the plants stand in stagnant water. When the pots are placed in the pans or saucers, fill the vacancy with a mixture of silver-sand and finely-broken—not powdered—charcoal: this will absorb the water that runs through the pot, and yield it back again to the plant, besides preventing stagnation. The time to water a plant is just when the soil begins to present an appearance of dryness, which is best seen when the surface is pretty firm, although it is advisable to stir it sometimes; but if, after stirring, the plant wants water, give it from a fine rose. This will settle it again, so that it is easily ascertained when the plants want water afterwards. Most of the plants before-named will continue blooming this month. If any are infested with aphis or green-fly, brush it off with a small brush, without injuring the plant. A few plants may be kept free from this pest by this means, without having recourse to fumigating with tobacco. Various sorts of herbaceous plants may be cultivated outside, on the window-ledges: being hardy, they will stand all weathers, but are best protected from severe frost, and winds, and hot sun; in fact, they do best in a north aspect during the summer, and those who have such situations cannot do better than choose from this class. There are the sedums or stonecrops, many of which are very pretty when in flower, as S. Siebaldii and others: even the common yellow and white stonecrops are interesting when in flower, and hang over the sides of the pot, completely covering it: they mostly have viscid, fleshy leaves, and stand drought without much injury; consequently they are good things to begin with. The Sempervivums, or houseleeks, are much the same in habit and style of growth, as some of the preceding: they are equally easy of culture. Then, again, there is the prolific family of Saxifrages, which includes the time-honoured London Pride, and species far too numerous to mention here, but all of more or less merit for pot-culture. Then, again, there are the Phlox species, as *procumbens*, *subulata*, &c., which are of dwarf trailing habit, very suitable to hang from a window-ledge. Primulas, as the double white, lilac, and red, and also Primula Auricula, before spoken of, are interesting subjects for practice on the window-sill. Many others might be mentioned, as Campanulas, particularly *rotundifolia* and *pumila*, Irises, Brellis, &c.; but the culture for all is much the same: they grow in sandy loam, and should have proper drainage. Chrysanthemums are very suitable for window-culture, and now is the time to propagate them from cuttings or offsets, to make neat bushy plants for flowering in November. Cuttings strike freely if planted round a pot, and placed in the shade. Offsets may be potted singly. Any that are advancing, and have filled their pots with roots, should be put into larger. Such as are growing vigorously may receive liquid manure two or three times a week. This is made by placing two or three shovelfuls of the dung of cattle into a tub, filling it up with water, and stirring it well round, then allowing it to settle, when it is ready for use. Some use guano in this way, but a much smaller quantity will suffice; and those who are not experienced in the use of these stimulants had better use them cautiously, and in a rather weak state. Their uses are to supply that nourishment to plants which they have exhausted from the soil; so that it can do no good where the roots have not reached the sides of the pots, and the plants are not growing vigorously. All soft-wooded and free-growing plants may be benefitted by its application in suitable quantities; but hard-wooded and fine-rooted plants, such as Ericas, Epacrises, Azaleas, &c., should receive very little indeed, if any, and that in a very weak state. Fast-growing plants, as Fuchsias, Geraniums, Genistas, &c., should not be frequently turned, since they always make a face towards the light, and the process might weaken them: it would be better to train them out fanlike, by means of thin painted sticks. Fern-cases may be turned occasionally. The plants in these have a like tendency; consequently they show best from the light. By turning the case, the faces of the plants are brought facing the room. If they can receive light directly overhead, it will be so much the better. We have one so placed, looking exceedingly fresh and pretty: it seldom requires any attention, and is watered twice only in the year. These may be planted with most of the British ferns, and a vast number of exotic ones are also suitable. Lycopodiums may be allowed to trail over the surface of the soil. Pteris arguta makes a good centre plant for a tall case; also Adiantum pedatum, one of the most graceful of ferns, but dies down every winter. The Aspleniums offer an extensive and numerous family to choose from, particularly A. viviperum, bulbiferum, paniculatum, and others, producing young ferns on the old leaves, and root in the air. The Scolopendriums are also suitable, and show well their broad shining leaves or fronds. Both the planting and management of these cases must depend a great deal on the situation or locality. In a dry warm room many ferns that are considered very tender may be grown successfully; but they will require more water, which should be warm when given, and less ventilation; for the dry air of a warm room, ill suited to most plants, is far more injurious to ferns; and some of them naturally come from warm humid climates; they must therefore be carefully treated in this respect. If an opening at each end were made, and this covered with fine wire gauze, it would admit air without any of its ill consequences. Plant-cases for window-gardening have been greatly improved of late. One—the invention of an invalid lady—is ingeniously contrived so as to hold hot water. A cistern beneath this, being replenished once in twenty-four hours, maintains a soft genial heat, so that many stove-plants can be thus grown and displayed to advantage. The zinc trough at bottom is filled with sand and charcoal, in which the pots are plunged. This being kept moist, diffuses a soft dewy atmosphere in the body of the case, which is in form a double cube. They are made by Pickard and Co., King's Cross, London.

1121. *Pansies,* or Heartsease, may be cultivated in pots: they are often raised from seed, which may be sown at any time from March to October, carefully repotting the young plants as they advance. They are also raised from cuttings or offsets, which strike readily. Pansies flower at almost any time of the year if kept growing, and are very ornamental, and vary considerably in colour: soil, gritty loam.

1122. *Cinerarias* are very ornamental while in bloom, and may be raised either from offsets or from seeds: if the latter, sow in July and August, in loam and leaf-mould, well sanded; prick off into small pots, and repot as they advance; in winter, protect from frost by means of mats or litter. They will flower in April, May, and June, and often later. If grown from offsets, take them off in September, and pot singly in 3-inch pots; otherwise treat as before. These like frame-culture, if protected from frost: in mild weather, a slight wetting of the leaves will be beneficial. The seed is not difficult to save, or may be procured at any respectable nursery. Plants raised from seed are sure to flower and look neat; but good sorts should be increased, or perpetuated by means of offsets.

1123. *Arums* are very ornamental as window-plants, on account of their fine foliage, as well as the large and singular flowers: they grow in loam, and require plenty of water. They flower in March, April, and May; after which they die down partially, and may be put aside in the shade till

October. *A. maculatum* deserves to be cultivated on account of its handsome foliage.

1124. *The Lily of the Valley* (*Convallaria majalis*) should have a place in the window. Where they grow thick in a border, clusters of them may be taken up in November, potted, and placed in the frame: they will flower much earlier than those out of doors. If the plump crowns are picked out and potted, a cluster of flowering-spikes may be had in each pot: after flowering, they may be plunged in the border again, and will probably flower the following year. If only small crowns can be had, they will be a twelvemonth before flowering.

1125. Intermediate *Stocks* will begin to flower now if sown the preceding July. They may be sown in a shady border at that time, and, as soon as large enough to handle, place three or four round a 3-inch pot: in October, they will be large enough to pot singly into the same sized pots. Stand them in the frame for the winter. As they exhibit the buds, the double and the single may be distinguished. Put the single aside, if wanted for seeding; otherwise they may be thrown away. They grow in sandy loam.

1126. *Ferns* also come in very useful, especially the Adiantums, or maidenhairs, and, most particularly, *acuneatum*. *Oncidum lucidum* is good for bouquets; *Pteris serrulata*, and also *P. rotundifolia*, for its dark leaf; and even the common Hartstongue if grown in a frame, or anywhere under glass, is very ornamental.

1127. *Citrus Aurantium*, common orange, is worth growing, both for the flowers and fruit, which, in winter, are very effective for table-decoration, if cut with foliage attached. *Solanum pseudo-capsicum*, called Winter Cherry, also the common Physalis, also called Winter Cherry, are very pretty in bouquets.

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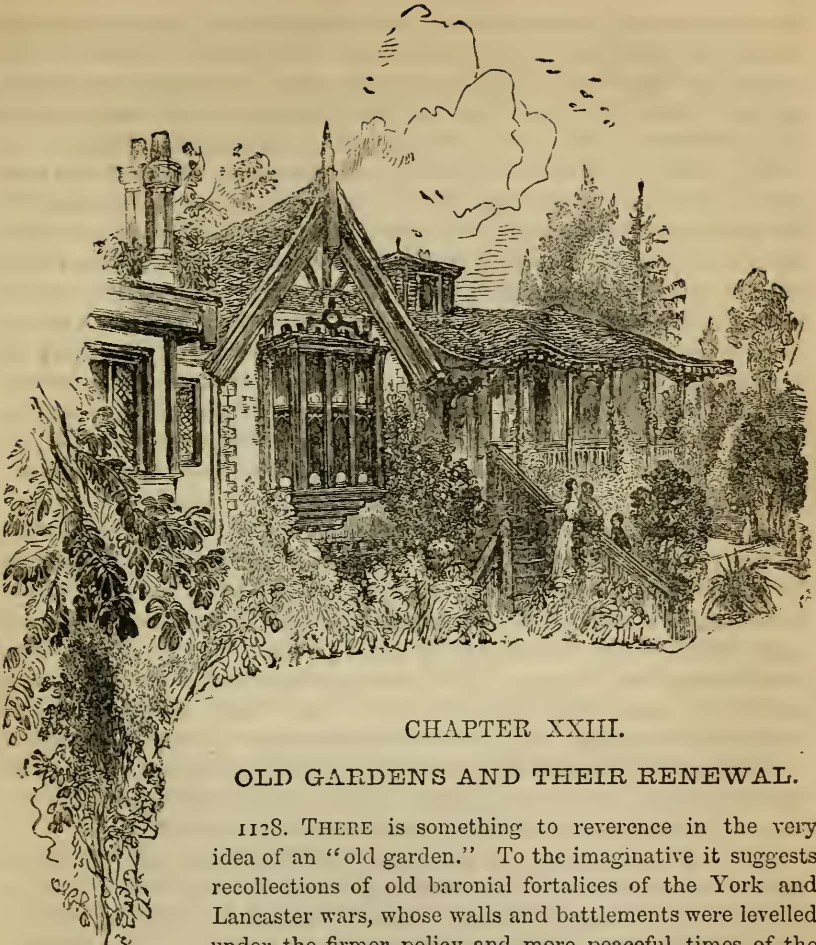

CHAPTER XXIII.

OLD GARDENS AND THEIR RENEWAL.

1128. THERE is something to reverence in the very idea of an "old garden." To the imaginative it suggests recollections of old baronial fortalices of the York and Lancaster wars, whose walls and battlements were levelled under the firmer policy and more peaceful times of the Tudors; grey weather-beaten stone walls, deep oriel-windows, heavy clustering chimneys, half-hidden, half-revealed, by masses of dark glossy ivy; broad gravel terraces, with retaining-walls and balustrades, decorated with Italian vases, resting on the foundations of the old battlements, with rich green lawn, and shrubbery, and park,—cornfields, meadows, villages, and spires, extending far beyond, until lost in the distance. This lordly picture may be replaced by the more humble priory-houses or abbey wrested from the Church, whose gardens were laid out by the "monks of old," who well knew how to select a pleasant and fertile site, and how to use it; or, it may be, by some snug Elizabethan cottage, so called, just far enough removed from the village, and at its best end, to give its inhabitants room to breathe,—a place of "lettered ease;" with mullioned windows, covered with creepers and perpetual roses; with dormered roof and many-angled gables, standing in a lawn, smooth, green, and short as the velvet pile which decorates its drawing-room, with broad flower-border, and interspersed with flower-beds, filled with old-fashioned bulbs and herbaceous plants, and ribbon-grass, with just such an amount of massed and bedded-out plants as show that the inhabitants, while preserving the antique character of the garden, are also alive to modern improvements.

1129. There is another recollection of an "old garden" which haunts many wayworn travellers on the path of life—the garden of early youth and childhood, where they were permitted to taste the first peach of the season, or to partake of the earliest and sweetest of gooseberries or strawberries, or feast on the earliest of mellow pears. Memory carries one back to such days, and to a grim Cerberus of a gardener, who kept the keys of such a garden, inclosed in walls too lofty to be scaled. But then the sweetness of those pears and gooseberries and strawberries when by good luck or favour they were obtained! No fruits of these days have a flavour like them. And what a glow of colour did that broad flower-border present in the glorious summer sun, for even the sun has lost the brilliancy it had while the century was yet in its "teens."

1130. But every medal has its reverse, and where one old garden brings golden recollections with it, nine others tell of indolence and neglect. Listen to the Rev. John Laurence, who had always had an "earnest desire to have a garden," and at last, "by the providence of God and the bounty of a generous patron," got a rural living and a garden. "Adjoining my house, when I came here," he says, "I found what they called a garden, of about thirty-two yards square, mounted with low mud walls, quite overrun with couch or twitch-grass, nettles, and a few stunted gooseberry-bushes, a worn-out soil, and a wet white clay within half a foot of the surface. The earnest desire I always had to have a garden made me look on with grief; but yet I instantly resolved to do something, that no time might be lost.

1131. "I was dissuaded by most of my neighbours, as thinking it a very vain attempt, and that I should lose my labour and charge as others had done. Not discouraged, however, I resolved to pull down the mud wall that faced the south-east, and to build me a brick one in its stead, nine feet high; which I did, by the help of my neighbours, the same summer. What methods I used to give myself any hopes of fruit in such a garden was made almost *invitâ Minervâ*, and will appear elsewhere. I can only say here, to encourage my friends, that in three years' time I began to taste the fruits of my labours, and ever since I have had plenty, even greater than I could reasonably expect."

1132. Most of our gardening friends will be familiar with another phase of "old gardens," in which the soil has been manured year after year, and cropped without any system of rotation, until it has become a mass of black pasty-looking earth,—rich, but altogether unsuitable for growing the ordinary garden crops and fruit-trees. The truth is, the soil is choked up with undecomposed dung, which is unfitted for the food of plants; and it has been cropped year after year with the same vegetables until it is completely divested of the particular constituent of soils which is necessary for the further production of that particular crop. The consequence is, the vegetables cease to thrive; the fruit-trees run to wood; peaches, nectarines, and apricots, canker and die, branch by branch; plums refuse to bear; apples are infested with American blight; pears make woody branches; gooseberries and strawberries produce large leaves and small fruit, or none. These evils prevail everywhere, except in the best-cultivated gardens, or where the proprietor thinks for himself: especially do they prevail in farm-gardens, the place where one would expect *à priori* to find a better state of things; in the suburbs of large towns, where the gardens are secluded from light by overlooking buildings, where the pure oxygen of the air is overloaded with carbon, the evils of indigestible manure exist in great force.

1133. The remedy for these evils depends on a vast variety of circumstances. Is the soil clay or loam? or does sand, gravel, or chalk prevail?—above all, is the drainage perfect? Few old gardens, unless they have been renovated during the last thirty years, can boast of thorough drainage, and without it all attempts at amelioration are vain. Let the proprietor, in this case—unless, indeed, the soil and subsoil are both sufficiently porous for water to percolate through readily—sacrifice his year's crop, thorough drain it at once, and either give a good coat of lime, trench and ridge it up for the season, or trench and take a crop of turnips or carrots from it, and re-arrange it for cropping in the autumn and spring.

1134. Where the drainage is in proper order, and the soil and subsoil such a wet tenacious clay as that described by Mr. Laurence, two modes of dealing with it present themselves. The most efficient would be to dig the soil three feet deep and pile it up in heaps for burning, as described at page 45, taking care that the soil is only burnt sufficiently to crumble between the finger and thumb on being rubbed.

1135. When the soil is a porous one, the only remedy is to mix it with a more tenacious soil while digging, thoroughly incorporating the two soils together, and enriching them with a liberal supply of thoroughly-decomposed dung or leaf-mould, in proportions suited to the intended crops.

1136. Returning for a moment to Mr. Laurence* and his thirty-two square yards of wet clay full of noxious weeds. "The first care," he tells us, "is to destroy these, so that what is sown or planted may not perish by *their* spreading luxuriant growth. For this purpose I have found no way so certain and effectual as laying the whole ground fallow all the summer, by digging it over two or three several times, always observing to do it during the greatest heats and droughts. This not only kills all the weeds, but it mellows and enriches the ground exceedingly, as all good farmers know very well. Most are naturally desirous to improve their ground; but if they sow with expectation of fruit while it is full of weeds, 'tis but labour lost, and they will repent it." "I do not speak thus with respect to planting fruit-trees," he says further on, "for I would lose no time in planting them, for, as it takes years to produce a crop from them, the season should not be lost."

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* Pleasures and Profits of Gardening. Bell & Daldy.

1137. Where the evil arises from a system of over-manuring, the remedy is to clear a good portion of the richest earth away. "Generally speaking," says a correspondent of the *Gardener's Chronicle*, "there are few places where an exchange of fresh earth may not be made; for this garden soil forms one of the most valuable dressings for pasture or meadow land which can be met with. It is not always possible to get turf, or even soil, from pasture land, which is the very best for garden purposes; but failing this, that from arable land, if moderately fresh and loamy, will form no bad substitute. When the rich top-soil has been removed, spread a good dressing of quicklime over the lower surface and fork it in,—if the lime is an inch in thickness it will not be too much. Afterwards road-scrapings or old mortar may be added when the soil is heavy, and marl or a dressing of the scourings of ditches when it is light. When this is well mixed with the lower spit, bring in the fresh earth and thoroughly incorporate the whole together.

1138. "Rather than do this imperfectly, it will be better that only a small portion should be done at once, commencing with those portions on which peas, cauliflowers, cabbages, onions, and carrots, are to be grown, leaving the parts appropriated to asparagus, seakale, and rhubarb, for after-consideration. Above all, the fruit-tree borders, if they cannot be entirely renovated, should only have one half of the old soil removed and replaced by fresh loam, having previously made a good rubble bottom one foot deep, over which two feet of the above compost should be placed for the trees. Many kinds of fruit-trees may safely be lifted, if done carefully, and the roots laid in any spare piece of ground while the borders are being renewed,—more particularly pears, plums, and apricots, which will grow on richer soils than the peach and cherry." Thorough draining is indispensable in all these improvements both in the garden and fruit borders. In the latter, intersecting surface-drains are recommended for aërating the soil as well as for removing moisture.

1139. "Where it is found impracticable to remove any portion of the over-rich earth, the next best thing is to employ those materials which are found by practice to counteract soils containing superabundance of organic manures. Lime is the best and the most readily procurable. A mixture of 64 bushels and 2 cwt. of salt is a valuable compost for old gardens, and is sufficient for one acre. Superphosphate of lime mixed with a small quantity of nitrate of soda is the next best; but it is more expensive. Both these applications should be forked in directly they are spread over the ground. A dressing of hot lime given every third year, adding phosphate of guano occasionally, would be a great improvement on stable-dung, no opportunity being lost of applying road-scrapings and marl, or calcarious soil, where much manuring is necessary. Liquid manure is a better material than stable manure for these gardens, as it is more easily taken up by plants; and with chalk or lime occasionally added, will tend to form a better and more productive soil, and one capable of keeping in good heart for years, without the danger of getting over rich."

Dr. Scoffern's work on the Chemistry of Soils, recently published, gives very useful information on this point.

§ 1.—OLD GARDEN-WALLS.

1140. Troublesome things to a gardener are old garden-walls, where years of nailing have loosened the mortar-joints, and left even the bricks full of holes; but they are even more troublesome as harbours of refuge for insects and all sorts of garden pests. When garden-walls get into this state, the first convenient opportunity should be taken for thorough cleansing and repair. In autumn, after the fruit is gathered, or in early spring, the weather being dry but not frosty, let every tree be unnailed, the branches tied carefully together with hay-bands to prevent injury from the wind, and the stem of each tree drawn gently away from the wall as far as can conveniently be managed without injury to the roots, and kept there by means of a rope placed round it about two-thirds of its height, which rope can be made fast by a stake driven round the border, at a little distance from the stem. The wall, being cleared, should be scraped to remove all moss and every kind of parasite that may be growing upon it. After this, if the weather be quite dry at the time, it will be found a very good plan to give the wall a thorough dressing with very thin size, put on boiling-hot with a large plastering-brush: this will effectually destroy all larvæ and eggs of insects that may remain after scraping. The wall can now be pointed in the usual way, using either cement or mortar made of newly-slaked lime and river-sand, great care being taken that all the old loose mortar in the joints is removed; otherwise the new jointing will not bear the nailing to which it is to be subjected.

§ 2.—OLD WALL-TREES.

1141. How frequently do we find the inheritor of an old garden praising loudly by-gone times in reference to some noble pear-tree against a wall, or covering perhaps one whole side of his house, calling to mind the bushels of fruit borne by it when he was a boy, and lamenting its present diminished produce. What is to be done with it? is the inquiry. The tree is, to all appearance, full of vigour, and it would be a shame to cut it down; besides, it must take years for another to fill up the space it occupies. Perhaps, also, there is some little fruit on it each year, though nothing to what a tree of the size ought to produce, for the centre never has a single pear or blossom-bud upon it. Look to nature! is the only answer to be made to one so inquiring; and you will find that all the fruit and all the blossom of the fine old pear-tree is upon the young wood, at the extremities of its branches. The case is clear, then: young wood must be encouraged, and old wood got rid of. Let any one try the following plan, and he will not be disappointed. Cut out, a pruning-time, all the lateral branches within one eye of the stem; but, in order to balance the tree, and give employment to the roots, let this be done by degrees; let every alternate lateral, on either side, be cut out each year;

and in a year or two, when fresh wood is filling up the bare spaces, the whole tree will be covered with bearing wood. Old and exhausted Chaumontel pears will well repay any one who will bestow this treatment upon them. It may also, with benefit, be applied to all espaliers, whether apples or pears, which are found to fall off in bearing, especially when they are found to bear, as is so often the complaint with old trees, only at the extremities of their shoots. Where the vigour of the old tree is expended in producing wood and leaves, with an inadequate supply of fruit, it probably arises from over-vigorous root-action. The remedy of root-pruning, described in paragraphs 292 to 298, may be applied with advantage.

§ 3.—RENOVATING OLD BOX EDGINGS.

1142. Nothing gives a more neat and agreeable appearance to a garden than well-kept box-edgings. The sort of box in use for this purpose is a dwarf variety of the common box-tree, or *Buxus sempervirens,* and which, with a little attention, may be kept in order for several years ; but, if neglected, as is too frequently the case, it very soon gets out of order. In old gardens, the box-edgings often look coarse and bushy, and full of gaps ; for this there is no remedy but to take all up, and replant. The plan is this :—Fork up the old box, and pull it into small pieces, with not more than one or two stems each, selecting the youngest and freshest pieces for immediate planting. These should be cut with a sharp spade or garden-shears, so as to be even at the top and also at the roots, leaving each piece about three or four inches in length. The old wood may be served the same way ; but, before these are used to form box-edgings, it will be better to plant them out in the reserve-garden for a season, in a rich light soil, to give them a start, without which they cannot be considered fit for edgings, as they will certainly not recover from their rusty and shabby appearance for a year or two. As box-edging, under the best treatment and greatest care, can hardly be made to last and look well longer than eight or ten years, it is very desirable to have a reserve of young fresh plants always on hand. At the time of planting, the surface of the soil should be levelled and flattened with a spade, and a trench cut sloping towards the gravel walk, so that the roots of the young plants may rest in gravel, and not in the garden-soil. This will prevent a rank growth, and make it an easy matter, by an annual clipping, to keep the edging within due bounds. This clipping should never be omitted, and the best time for it is towards the end of June ; for the box, after this, will soon recover its freshness at this season.

§ 4.—GARDEN TURF AND LAWNS.

1143. During spring, and the early summer months, all garden turf and lawns will require very great attention. If they are to look well for the rest of the year (and we must remember that the general appearance of the whole garden depends much upon the state of the turf), it is now that the broom and the roll must be kept in constant use. If the grass, from the nature of the soil, is inclined to grow rank and coarse, it will be much improved by a good dressing of sand all over it; if, on the other hand, it has a tendency to scald and burn up, it will receive great benefit from a sprinkling of good guano or soot just before a shower of rain. Just before regular mowing commences, it will be well to go over all grass, carefully removing rank and unsightly weeds, daisies, dandelions, the little buttercup, &c. &c. Wherever the turf is mossy, it is a very good plan to rake it well with a sharp five-toothed rake; but it must be borne in mind, that under-draining is the only effectual cure for moss. Daisies should never be allowed to flower: a good daisy-rake, with a little trouble, will remove all flowers as they come out; but the only plan to clear a lawn effectually of these disagreeable weeds is to take them out with the *daisy-fork* wherever they are found. This clever little tool, which consists of a wooden shaft of any length, shod with a cleft iron prong, having a half-round of iron at the back to act as a fulcrum, may be used by any lady or child; and in process of time the most hopeless pieces of grass may be cleared by it. We have known turf, quite white with daisies in the spring, cleared entirely in the course of a season. The neat appearance of the garden will well repay the time and trouble spent in the continual use of the daisy-fork. We know a rectory garden in the east of Norfolk, where there is a piece of turf of about a quarter of an acre, which a year or two ago was one mass of weeds and daisies, and which now is as fine and beautiful as any turf can be. This change was entirely brought about by the children of the village-school, who had each a yard or two measured out to them on half-holidays, which they cleared, some with daisy-forks, and others with two-pronged table-forks, receiving some little present as their reward. A few showers of rain and a heavy roll soon obliterated the holes they made; and fine grass was not long in filling up the spaces hitherto occupied by weeds.

§ 5.—SHRUBBERIES.

1144. In old gardens, it is no unfamiliar thing to find the lawn and borders skirted by long, unbroken belts of shrubs, intermingled in pell-mell fashion, the lower part of most of the deciduous shrubs lean and naked, long since denuded of their smaller twigs. Confusion rather than order seems to have been encouraged. Stems bare and naked at the roots show only straggling wiry branches towards the summit. When the shrubbery has acquired all or any of these characteristics, renovation, in whole or part, has become indispensable.

1145. Shrubberies skirting winding paths, either as a screen to unsightly objects or as shade and shelter from sun and wind, are perhaps the most agreeable portions of a garden; but in order to be so the shrubs must be cultivated with as much care as is the most choice individual plant of the parterre

They should be selected for their close and evergreen habit of growth, and the habit increased by high dressing, judicious pruning, and pegging down. This compact habit of growth, however, can only be maintained in their beauty for a number of years by planting the shrubs so far apart that they may not touch, every one having free liberty to show and preserve its individual habit, no two shrubs being suffered to touch each other; the ground between being kept clear by frequent raking and hoeing. There are some happy exceptions to this rule of planting. The rhododendron does well planted in masses, and where the shoots are pegged down, they soon present a broad mass of green on the margin of the clump or shrubbery, when the turf can be carried up to its lowest branches. Behind these dense shrubby evergreens, the taller thorns, Turkey oak, the sorbuses, and other trees of moderate height, of the fancy arboretum varieties, might be planted at intervals for shade and breadth of effect.

1146. Shrubberies on the verge of the lawn would naturally be planted with the best small flowering shrubs on the margin, either in masses or singly: if in masses, the shrubs should be pegged down, so as to present a continuous mass of vegetation along the whole margin, relieved as before with a background of ornamental trees; leafy masses of rhododendrons, squatting down to the margin of the turf by pegging, form an admirable connecting link between the grassy sward and the individual shrub and dwarf trees behind them. Where the shrubbery is planted for individual effect, those of an enduring growth and elegant habit should be chiefly used. Where there is space for such display, the lawn adjoining the shrubberies may be advantageously dotted with single evergreens, and some of the more elegant-flowering deciduous shrubs. An occasional hemlock-spruce, with its weeping plumes; a holly whose lower boughs, still fresh, sweep the turf on which it is planted; or the graceful Cedrus Deodar, or Araucaria, in order to break the outline and relieve the meagreness arising from the single mode of planting the deciduous shrubs. Another mode of relieving the nakedness of newly-planted shrubberies is the introduction of hardy flowering plants: this may be adopted with excellent effect until the lower branches have made sufficient growth to admit of the surface being turfed up to meet them.

1147. In planting or renovating the lawn and shrubberies, due attention should be paid to their different seasonal effects. There are a few which herald in the spring; such as Chimonanthus fragrans and Cornus masculă. The Mezereon, Ribes sanguineum, Corchorus japonicus. In conjunction with these, the strongly-characterized Cryptomeria japonica, Abies canadensis, some trees of the Sumach family, deciduous cypresses, purple beech, and weeping laburnums, might be planted with effect. There are so many noble trees which present rich gradations of tint in autumn, that it is almost needless to name them. The old Virginian creeper is more beautiful in its autumn costume than in its vernal hues. The scarlet and other American oaks, the wild cherry, Kölreuteria paniculata, and many others, have a splendid effect either by themselves or the skirts of the shrubbery; and all the new Coniferæ, recently introduced, are treasures by themselves, and well adapted to fill up the background of the shrubbery. Pillared roses may also be introduced with excellent effect.

1148. But high-keeping is the great element of success in the shrubbery as in the flower and kitchen garden. Keep the soil in good heart by dressing with properly-prepared composts. Remove all traces of disorder in the soil by constant use of the rake; let no trace of weeds appear; study the natural habit of every shrub, and keep it under control by the timely removal of exuberant growth; remove all decaying blossoms not required for seed; peg down early and continuously, in order to encourage the development of trusses of flowers, giving to each and all a combined air of freedom and trimness, and the result will be order, elegance, and beauty. Appended is a list of—

Choice Deciduous Shrubs, &c.

Althæa frutex, — bears various-coloured flowers, like single hollyhock; blooms early.
Almond, — dwarf and tall; bears pink flowers; very early.
Azaleas.—These may be had of many colours,—scarlet, red, orange, yellow, pink, bronze-colour, and shaded; blooms early.
Buddlea globosa, — orange-coloured flowers.
Berberry,—flowers in bunches, yellow, and succeeded by scarlet berries.
Calycanthus floridus, — allspice-scented wood, with brown flowers.
Chimonanthus fragrans, — dull-coloured; flowers in the winter, highly scented, and before the leaves appear.
Cherry,—double-flowering.
Clematis (various).—The common is very hardy and fragrant.
  ,, Siebaldii, — white, with blue centre.
  ,, azurea grandiflora, — rich purple.
Cydonia (*Pyrus*) japonica, — scarlet flowers; blooming several months in the year.
Cytisus (Laburnum),—yellow, purple, and other varieties; flowering early in the spring.
Daphne Mezereum,—red and white.
Deutzia scabra,—flowers white.
Gueldres rose, — bears white balls of bloom.
Thorne's Cratægus, — red, double and single; pink do.; white do.; and many varieties of fruit and foliage.
Jasminum nudiflorum,—yellow.
  ,, officinale,—white.
Lilac,—purple, pale, white, Persian, and other varieties.
Lonicera,—an immense number of species and varieties, and nearly all good, ranging from 3 to 15 feet.
Magnolia conspicua.
  ,, purpurea; and many other excellent species and varieties.
Peach,—double-flowering.
Philadelphus Syringa, — highly-scented white flower; leaves small, like the cucumber.
Ribes sanguineum,—crimson flowers.
  ,, album,—white do.
  ,, aureum,—yellow do.
  ,, speciosum, — scarlet; a double variety,—and many others.
Robinia (Rose-acacia), — pink flowers; several varieties.
Roses. — There are upwards of 1,500 varieties and species; but a list of these will be found elsewhere.
Spiræa,—many varieties, and all pretty.
Virginian creeper,—will grow to the top of a house, and the foliage turns crimson in autumn.

1149. Few things afford stronger indications of the necessity of renovation and reform in a garden than the state of the evergreens and hedges. These are so easily and so insensibly suffered to grow wild, and are so seriously injured by want of care and the proper use of the knife, that neglect cannot go on very long without its ill consequences becoming manifest. Portugal laurels and many other evergreens may be cut in; but with the common laurel it is a saving of time to cut it down at once; so also with the arbutus and sweet bay. Thorn, privet, and holly hedges, which from years of neglect are found to be occupying too much space, must be cut in. The two former may often be cut down with advantage to within a few inches of the ground, and the latter cut close on all sides to the single stems. In a few years new and fresh wood will fill up all vacant spaces, provided the soil is enriched and kept free from weeds. Nothing is more beautiful than the quickset or hawthorn hedge when kept up properly; and among other things the railways did for us, they taught us practically that the hawthorn required to be controlled and cultivated like other plants, in order to perform its office in civilized life as distinguished from its wild state. All these hedge *plants* do well in a stiffish loamy soil, and if such is not the natural soil in which they are to be planted, they will repay the trifling expense incurred in making it. In making a new hedge, whether of hawthorn, privet, or holly, the plants are taken from the nursery when well rooted and about a foot high. The bed is prepared for them by raising a bank more or less high according to circumstances, digging the centre about a foot broad, and in the middle of this plant the young shrubs. The banks may be turfed, or grass seeds sown on them, but the summit of the ridge on which the hedge is planted requires to be stirred occasionally, and kept perfectly clear from weeds. The young hedge, if properly planted, requires little further care except watering if dry weather follow the planting, stirring the earth from time to time and careful weeding: here, as in other branches of cultivation, the soil cannot feed two masters. There are several species of the beautiful Cratægus suitable for hedges, and a mixed hedge of the white and pink May, or Glastonbury thorn, would be a beautiful object in any garden and an excellent fence between fruit and kitchen or flower-garden. Meanwhile, if a screen be needed in the garden, it may easily be managed, and with a very good effect, by means of hollyhocks and chrysanthemums. Hedges of either of these flowers will serve to shut out from view anything that may be required, and at the same time produce a beautiful effect. Hollyhocks can be staked separately in the line where they are wanted; but with chrysanthemums the best plan is to stretch a rough wire-fence to which they may be trained. This may be made of a few rough stakes supporting three or four rows of wire, over which on both sides the plants may be trained after the fashion of espaliers, so as to cover all the framework. Many other plants also there are which will suggest themselves to every gardener as capable of forming a pleasing and effective temporary hedge.

§ 6.—FLOWER-BORDERS.

1150. In old gardens the flower-border was an important object, nor is it superseded even now by the more modern bedding-out, massing, and clumping system. It is the natural abode of the Pink, Carnation, Stock, Gillyflower, the Wallflower, Hyacinths, Roses, and Heliotropes, with many other gems whose fragrance loads the atmosphere, while their beauty charms the eye; of the Tulip and Pæonies, crimson, rose-colour, and pink, whose brilliant colours fill the eye. Such mixed borders, when kept highly dressed and judiciously planted, well-selected and arranged, possess great interest. But it is the tendency of many of the herbaceous plants to become crowded, and to exhaust themselves. Phloxes, Asters, Monardas, Delphiniums, and other free-growing plants, soon choke their delicate companions, leaving little room for the more graceful Gentians, Aquilegias, Camassias, Lychnises, and Gnaphaliums. Unless these are parted, spring-dressed, and re-arranged every season, all arrangement and proportion is destroyed. The plants of coarser habit expel the more delicate flowers, and with it all idea of order and proportion, on which so much of the beauty of the garden depends.

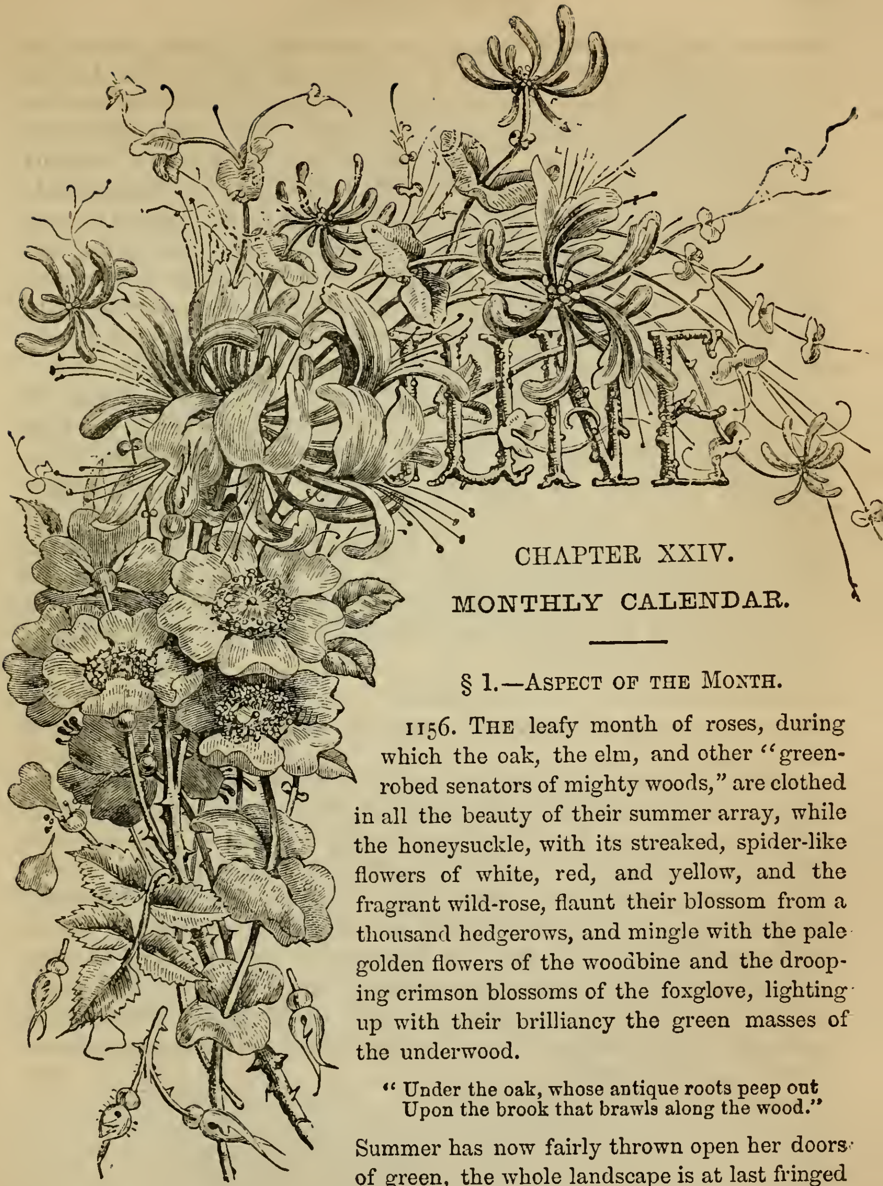
1151. Supposing this state of things has gone on until entire renovation has become necessary; that the border is exhausted by continually growing the same things for years, and a radical remedy is required, there is only one which is effectual. Remove the plants to a place of safety, and either dig out the old soil to the depth of two feet, and fill up again with a rich light compost of sandy loam and leaf-mould, or, if the base of the soil is pretty good, mix it with equal portions of the same compost, with a copious manuring with well-rotted dung, and trench it two feet deep, taking care that the drainage is in proper order. Where fruit-trees occupy the walls on such a border, it will be well to leave a space of two feet from the wall, slightly raised above the general surface of the border, unplanted, for the benefit of the trees.

1152. On a border thus prepared the plants may be replaced, taking care that young plants of Phloxes, Asters, Pentstemons, and similar exhausting plants, are selected, leaving the old stools in the reserve beds to propagate from; for it is found that young herbaceous plants, propagated from old plants the previous summer, yield the best flowering plants for the beds or borders. In replanting, strict attention should be paid to their height, the dwarfish kinds being in the first row, the next in size in the second ; and so on, placing the tallest sorts behind. The same attention should be paid to their colour and time of flowering, so that the green of the late-blooming kinds should blend harmoniously with the colours of early bloomers, and these with each other, and *vice versâ*.

1153. Where a very choice selection of border flowers is aimed at, Mr. Cox, of Redleaf, recommends planting close to the wall, at distances varying from two to three feet, dwarf-growing varieties of tea-scented, Noisette, and other continuous-blooming roses, such as Elise Sauvage, La Pactole, Adam's Mirabile, Strombio, Solfaterre, Victoire Argent, Reine des Vierges, Camellia blanche, Pink Noisette, Ame, Odorata blandescens, Princess Valerie, Ida, Gloire de Rosamanes, Bouquet de Flore, Yellow China, White China, Devoniensis, Queen, Androselle.

1154. Between these and the wall plant Silicum japonicum and sibericum; Thunbergia longiflora and speciosa alba; Alstrœmeria pulchella, Van Houtii, aurea, Hookerii, and psittacina; Gladiolus gandivensis, insignis, cardinalis, and psittacinus; Amaryllis Belladonna; Camassia esculenta. In the front, between the roses and the edging, plant Ixias, Tritonias, Watsonias, and Sparaxes, which, in such situations, if planted five or six inches deep, will flower well. These intermixed with the beautiful Anomatheca cruenta and juncea; Harperoscordum lacteum; Calochortus venustus and splendens; Vieusseuxia pavonia; Sternbergia lutea; Oxalis floribunda, divaricata; Bowena Deppi, violacea, and elegans. Patches of Tigridia pavonia and conchiflora, planted judiciously here and there, with Lausochneria californica, Anemone japonica, and Japonica hybrida, planted in peat, will also be suitable occupants of such a border, in which some of the best dwarf bedding-out plants may be planted out in summer to fill up vacancies. Many of these are surpassingly beautiful, Mr. Cox adds, and a portion would be in flower from early spring till the frosts set in, when the whole border should be covered with a layer of decayed leaves, at least four inches thick.

1155. It not unfrequently happens, and that in gardens once famed for the luxuriance of their plants on bog or peat borders, that a period of decay arrives. Rhododendrons become sticky, moss accumulates about their roots, and their leaves flag and look sickly at the slightest drought. Kalmias, also, have continually dead branches to be removed, and Azaleas do not make the new wood they ought. These are undoubted evidences that renovation is required, and should be forthwith attended to. A top-dressing of the soil, with a mixture of well-rotted manure from the cow-yard, and fresh peat or bog, may do some good; but if evidences of decay are very striking, it will be far better to take up all the plants and dig in a good change of soil. Bog-earth which has been kept for a season, and turned two or three times, is, of course, the best; but, in the absence of this, leaf-mould and cow-dung may be used. Those rhododendrons which have run too far from home, and bear leaves only at the extremities of long sticky branches, must be cut down. The season of the year best suited for pruning rhododendrons is immediately after the flowering season, that they may have all their growing period of the year before them to make fresh shoots. Rhododendrons of any size may be taken up and removed, and not unfrequently with great benefit, as far, at any rate, as flowering is concerned, if care be taken that the mould about the stem and roots be not disturbed. In cases, however, where bog-plants come up very easily, having no hold in the ground, and with a hard ball of earth about the roots, which appears disinclined to blend with the surrounding soil, it is frequently of great advantage to loosen this ball and open the roots a little before the plants are placed in their fresh bed.



CHAPTER XXIV.

MONTHLY CALENDAR.

§ 1.—Aspect of the Month.

1156. The leafy month of roses, during which the oak, the elm, and other "green-robed senators of mighty woods," are clothed in all the beauty of their summer array, while the honeysuckle, with its streaked, spider-like flowers of white, red, and yellow, and the fragrant wild-rose, flaunt their blossom from a thousand hedgerows, and mingle with the pale golden flowers of the woodbine and the drooping crimson blossoms of the foxglove, lighting up with their brilliancy the green masses of the underwood.

> "Under the oak, whose antique roots peep out
> Upon the brook that brawls along the wood."

Summer has now fairly thrown open her doors of green, the whole landscape is at last fringed with foliage, the fields are ancle-deep in flowers; wild flowers are indeed too plentiful to be named here. The garden also is in full bloom—roses of a hundred hues, the fragrant honeysuckle and jasmine, load the air with their perfume.

> "Now broad carnations, and gay spotted pinks,
> And showered from every bush, the damask rose,
> Infinite in numbers, delicacies, scents,
> With hues on hues, expression cannot paint!"

The direct power of the sun's rays, indeed, is now at its maximum, although the radiation of heat from the earth's surface, which decides the temperature of our atmosphere, does not attain its highest point till August. The variation of the temperature is still great, ranging, according to local circumstances, from a few degrees above freezing to 90°, the mean heat being 58°. The average mean temperature at Chiswick, for a period of ten years, at one foot below the surface, was 60°; at two feet, 58°; and on the surface, 60° 45′; the mean maximum and minimum being respectively 64° 13′, 63° 10′; 81° 13′, 45° 10′. The dryness of the atmosphere is also at its height in our moist climate, and vegetation now depends on the "Orient pearl;" the dew, with which the atmosphere is laden, is condensed, and every blade of grass and leaf saturated with it an hour or two after sunset and sunrise. Beautiful indeed are the mornings and evenings of June, when the dew hangs upon leaf and blossom, and beautiful the economy of Nature as displayed in this arrangement; for the formation of dew is an illustration of the law of attraction. The aqueous vapour, held in suspension by the atmosphere coming in contact with leaf or blade of grass, or other non-conducting body of a slightly lower temperature than itself, is attracted to it and condensed. The temperature at which this phenomenon occurs is called the dew-point, and the moisture thus deposited is an important portion of the food of plants at this period of their growth.

§ 2.—FLOWER-GARDEN AND SHRUBBERY.

1157. Until the individual plants in the beds are sufficiently grown to meet one another, and intermingle their foliage, the beds cannot be expected to harmonize perfectly; but this period of their growth is approaching, and some judgment may now be formed of the taste with which their arrangement has been carried out. The growth of some of the bedding-plants will be promoted by slight shading from the noonday sun; others, as the verbenas, grow faster when exposed to dry cool air; and all grow faster and fresher when watered occasionally. This should be done in the evening, and copiously, but not too often, stirring the soil amongst calceolarias, pegging down the lateral branches of verbenas, ageratums, petunias, and anagallis, so as to cover the ground.

1158. As soon as the beds, borders, &c., of the flower-garden are finished, the baskets and vases filled, and the general spring planting-out brought to a finish, the remaining stock of bedding-plants should be looked over. A portion will be required for stock; and as a considerable number of plants will in all probability be required to make good failures, or to replace beds now occupied with short-blooming plants, and other demands through the season,—these, with few exceptions, had better be kept in pots; and, therefore, if any unpotted cuttings yet remain, let them be potted off into clean pots. Re-pot others, also, getting too full of roots, plunging them afterwards in ashes, in a cool shady situation, and pinching off all early or premature blooms: they will soon be ready for turning out. A few kinds of annuals should also, for the same purpose, be sown on a light soil and shady border. By frequently transplanting and stopping, their tendency to bloom will be encouraged, and the formation of roots promoted, and they will soon bear removing to the permanent beds without injury. It will add much to the effect of vases, &c., if, after they are filled, a few trailing plants are put in to peg over the surface of the mould, and ultimately to hang over the sides. For the larger ones the different kinds of maurandyas and lophospermums are well adapted, while for the smaller vases, baskets, &c., dwarf loosestrife, and plants of similar habit, will add much to their beauty. Moss, which we so frequently see used for the purpose, can never present so elegant an appearance. Those plants which interlace the meshes of basket-work, require continual attention now, covering over the soil with some of the spreading lobelias, whose colours when in bloom harmonize with the trailing plants, and have an excellent effect.

1159. The newly-planted beds require constant watching. All failures should be instantly made good, and the tying and staking of everything requiring support attended to. Where an early display of flowers is not wanted, the buds may be pinched off. Cuttings of Iberis saxatilis root readily under a hand-glass at this season; when placed in a shady situation, they form a beautiful edging, and may be cut like box for a week or two, to encourage the plants to cover the ground. Pansies, anemones, double wallflowers, and other spring plants, should be removed as they go out of bloom, to make room for autumn-flowering ones, the beds being made up with fresh compost, in planting the later. Creepers against walls or trellises should be gone over and tied or nailed in.

1160. *Rose-Garden.*—Standard and pillar roses should likewise be looked over to see that they are properly secured to their stakes. This being the month in which roses are in their glory, care should be taken that their effect is not destroyed by imperfect buds or deformed flowers. Weak-growing shoots should be tied up and regulated, and all fading flowers and seed-vessels removed, cutting back the perpetual or autumn-flower kinds, as soon as all the flowers of the branch are expanded to the most prominent vertical eye, stirring the ground and saturating it with manure-water, or sprinkling the ground with guano and watering with soft rain-water.

1161. Towards the end of the month many shoots will be firm enough for budding, and some sorts work best on the flowering shoots, provided the buds are taken before the flowering is over. In selecting buds, take those of moderate size; clean off the thorn, cut the leaves off, leaving only about half an inch of the stalk or petiole to hold by; then with a sharp knife take out the bud, beginning half an inch above the eye, and bring the knife about the eighth of an inch below; with the point of the knife separate the wood from the bark, without interfering with the wood which remains in the eye, leaving it so that, when inserted on the stock, the wood left may be in immediate contact with its wood.

1162. Having removed the thorns on the intended stock, open the bark at the most convenient spot for the insertion, by drawing the point of the knife down the centre of the shoot, and by a cross-cut, where the other begins, raise the corners of the bark sufficiently to introduce the lower end of the bud:—press it down till it is opposite to the corresponding bud on the stock, and bind it up with a piece of fine bass or worsted thread, leaving the eye so that it is just visible. After three or four weeks it should be examined, and the band loosened a little. In cases where the bud does not separate freely from the bark, the wood may be tied in also; but the operation is both neater and more efficient when all the wood except that in the eye is removed. Cloudy weather is generally recommended for the operation; but Mr. Saul, of the Durdham Downs Nursery, Bristol, says he prefers bright, warm, sunny weather, provided the stocks are in proper condition; and we can have no better authority than Mr. Saul. This operation may be performed any time from June to September, and even as late as October, August being suitable for the greatest number of roses, the test being of course the maturity of the shoots. We shall have some remarks to offer in one of these months on the choice of stocks and laying out the rose-garden.

1163. Close watching is now required to prevent the ravages of the rose-maggot, washing daily with the syringe: to dislodge the green-fly, a little ammonia or tobacco mixed with the water is useful. In the shrubbery tying up and mulching is the chief employment of the month. As the rhododendrons and other American plants go out of bloom, remove the seed-vessels and soak them well with manure-water prepared from cow-dung, mulching the roots.

1164. In dry weather frequent and copious waterings must be given, not only to the recently-planted trees and shrubs, but to the bedded plants, annuals, &c. Mulching wherever practicable should be adopted, as well as damping the foliage of newly-planted shrubs every evening. Carnations, picotees, and herbaceous plants, with the taller-growing bedding-plants, should be staked and tied up to prevent injury from high winds. About the second week, hollyhocks, phloxes, delphiniums, asters, &c., should have the shoots thinned out before being tied up, to prevent an appearance of overcrowding, as well as to improve the size of the flowers. When showery weather occurs, let the box be clipped. London pride, thrift, daisies, &c., used for edging, should be taken up once in two years, divided, and replanted when the blooming season is over.

1165. The most pressing work about the middle of the month is that of keeping the place in order. The edgings, whether of grass or box, or other evergreen, should be repaired or clipped now. The effect produced at this season will amply repay the trouble; and in flower-gardens the effect is excellent. Evergreen hedges clipped now have time to make and mature a new growth before winter, while the season is far enough advanced to prevent their growing much out of shape.

1166. Watch the different annuals as they come into flower, and mark those varieties whose superior habit of growth, size of flower, or brilliancy of colour.

makes it desirable to procure seed from them. Destroy inferior sorts as soon as they expand their first flower.

1167. By the end of the month, the last of the spring-flowering bulbs should be ripe enough to take up; and if the plants intended to occupy their places have not been already introduced between them, they should at once be planted, altering or improving the soil of the beds to suit the habits of the fresh plants. The American garden, if a separate establishment, will be in full beauty, and every means should be taken to keep it so. The turf and the gravel should be kept up to and under the branches in the best order.

1168. Among the evergreen plants which are suitable for the shrubbery or border, none can excel the Camellia; and there are a few varieties of this beautiful shrub which do well in the open ground. When speaking of the value of north borders, p. 274, we took occasion to remark that many plants and shrubs would flourish there which in other situations would not outlive a winter's frost; and among others we mentioned that all the hardy sorts of camellias would do well in such situations. As camellias are so much and so justly admired, it may be useful to enumerate some of the sorts which are known to flourish and blossom freely against a north wall or upon a north border, and to make one or two observations upon their culture and the soil best adapted for them. The sorts best suited to open-air cultivation are Carolina (double white), Pæoniflora, Prince Leopold, Perfection, Eclipse, Dahlia-flora, Imbricata alba, Duchess of Orleans, and Bealii. The soil in which they are planted should be a mixture of peat, leaf-mould, and cow-dung, about two feet deep. Great care should be taken that the plants never suffer from drought. After flowering they should be freely watered with liquid manure, especially if the season be dry. The surface of the ground just round the stems of the plants may frequently, with very good effect, be paved with small stones, which assists in keeping the roots cool and moist. As a general rule, the borders on which camellias are planted should not be disturbed more than is necessary to remove the surface weeds. A top-dressing of fresh soil may, with advantage, be given to them every winter. So treated, the sorts of camellias mentioned above will be found as hardy as most of our common evergreens, and require no protection, except, perhaps, in an unusually severe winter, when a few fir boughs may be placed before or around them. The snow should never be allowed to rest upon their branches. Some growers of camellias in the open ground bind straw round the stems of their plants, about five or six inches from the ground. When winter sets in, this is found a very efficient protection against frost.

1169. *Florists' Flowers.*—Tulips will now require the chief attention; and by proper care and protection their season of bloom may be considerably prolonged. The beds should be gone over carefully, and memoranda made of the style or character of the flowers individually. For instance, tall flowers should be marked to go in the fourth or middle row, whilst the height of others should be noted, in order that a proper degree of uniformity may be attained at next planting. All flowers stained at the base should be excluded in collections intended for exhibition ; for, though they may mark prettily, this defect is fatal to competition : those having long disproportioned cups or pointed petals are also defective for that purpose. Whenever addition is made to the bed, make the selection when they are in bloom. By this means you are certain of the strain. If seed is required, let the hybridizing or crossing be done now, selecting finely-formed and pure flowers on both sides ; do not, however, cross a rose or byblomen with a bizarre.

1170. *Dahlias.*—Dahlias already planted out should be watered in the evenings with soft water overhead, the soil being previously stirred, and others planted out for later bloom, taking care, in hot weather, to mulch round the roots, where it can be done without being unsightly, with short well-decomposed dung. As the shoots advance, train and tie them up carefully, and search for earwigs and slugs in the mornings. A ring, or circle of copper, placed on the ground round the stem, it appears, will prevent this latter pest from approaching the leaves of plants.

1171. *Ranunculuses* will be making rapid growth. Always water in the evening, and with water which has been exposed to the rays of the sun. When they begin to show colour, the awning, or other shade, should be placed over them : a few hoops extended over the bed, with mats on the sunny side, for a few hours in the middle of the day, will suffice, and greatly prolong their beauty. While the bloom is fresh, give water ; but as it fades, discontinue it, and keep them from rain.

1172. *Carnations, Picotees, and Pinks,* as they advance, should be tied to their stakes, reducing the number of the shoots according to the strength of the plant. Care should be taken that the flower-pods of pinks do not burst ; and those having ligatures round them will require easing and re-tying. Shade any forward flowers, giving plenty of water and liquid manure. The larger stalks of the pink, or grass, as it is technically called, when separated from the parent plant, may be "piped" now ; that is, the upper part of the stalk may be drawn out of its sheath or spathe, and struck in light sandy soil, under a hand-glass. This being done for the larger stalks, the plants will put out abundant stock for later cuttings. At the end of the month, or early in July, the main crop of pipings or layers should be got in. See this is done by making a slight hotbed, and covering it with six inches of sandy soil, in which the cuttings or rooted pipings may be planted, covering them with small hand-glasses, or they may be struck on a shady border. The delicate operation of fertilizing should be performed on such as it is desired to keep for seed. This is the only true way of getting first-class seedlings, and both parent plants selected for experiment should be the most perfect of their kind.

1173. *Auriculas* and *Polyanthuses* should be removed into a northern aspect, all decayed petals taken away from the seed-pods, and as the capsules turn brown, they should be gathered. Water as they require it, and keep the pots free from weeds. Stake and water hollyhocks freely.

1174. *Pansies* struck from cuttings in April and May will produce fine blooms if planted in shady situations, or potted into 6-inch pots, and shaded in very bright weather. Cuttings may still be taken from promising plants. Mark all seedlings having good or singular properties. Though a flower may not be of good form, still, if it have any novel traits of character, it will be advisable to save seed from it, in order to perpetuate or improve both these and its form. At the end of the month, side-slips may be taken and cut down. Strong straggling plants will afford a good supply of rooted cuttings for making up autumnal beds.

1175. About the second week, the awning may be taken from the tulip-shed, and the foliage of the plants exposed fully to the action of the sun and rain. Offsets in warm situations will require taking up before those on the main bed: as soon as the foliage turns yellow, they may be removed with safety. Seedlings which have grown one year should be allowed to remain in the ground during the first winter; when two years old they may be lifted and kept separated.

1176. Offsets and exposed beds should be taken up at an earlier period than those that have been covered, choosing a dry day for the purpose, as soon as the foliage begins to change. They should be stowed away in some dry airy place, where mice cannot have access to them, leaving them there till the bulb is thoroughly dry, the fibres, husk, and skin remaining also.

1177. Sorts which it is desirable to save seed from should have the seed-pods covered with a piece of glass placed in a notched stick. This will preserve the crown from receiving moisture, and prevent decay. Remove the seed-vessels of all others, as the bulbs become ready to take up sooner than if they were allowed to remain on.

1178. *Reserve-Garden.*—A shady piece of ground in the reserve-garden should now be prepared for cuttings of double wallflowers, rockets, sweet-williams, pansies, and other plants required for next spring's bloom. Alreetias and many other spring-flowering plants may also be divided and planted out this month; and beds of annuals for autumn-flowering should be sown in the space left by the zinnias, China asters, and marigolds planted out.

§ 3.—THE MIXED KITCHEN AND FLOWER GARDEN.

1179. *Mushroom-Growing.*—Mushrooms may easily be had at any season of the year by adopting an artificial process, and spawning, with Milltrack or other artificial spawn, a bed made after the following manner:—The best situation for the artificial growth of mushrooms is a cellar or underground tool-house, or any other place where the atmosphere is of that close, damp, foggy character which is always so peculiarly favourable to the growth of fungi. The antechamber or passage to an ice-house is an excellent place for a mushroom-bed, and is frequently made use of for this purpose: any shed, however, whether underground or not, may be made available; and, indeed, with a little more care, mushrooms may be grown in the open air, without any roof to cover them at all; but a cellar or underground hole has a decided preference. The foundation of the bed must be well-rotted manure from the horse-yard, which has been sweetened by being turned over two or three times: it may have a little good loam mixed with it, in the proportion of about two barrows of loam to twelve of manure. The bed is best made on a gentle slope, and the manure should be well and firmly beaten down with a spade. When the heat has fallen to about 75°, the spawn may be put in. This artificial spawn, which is usually made up in cakes, must be broken up into pieces about two inches square, and placed all over the bed, upon the surface of the manure, about 10 or 12 inches apart. A covering of 1 inch, or 1½ inch, of good garden loam is then to be placed all over the bed, and the surface again beaten firm with a spade. The whole must then be covered well over with straw or other material, to exclude all light. The growth of the mushrooms will, of course, depend somewhat on the state of the atmosphere; but in a temperature of 45° to 55° they will usually begin to appear in about six weeks. Little or no water should be given to the bed until the mushrooms begin to come up, as its own moisture and heat ought to be sufficient to start the spawn; but as soon as mushrooms appear, a plentiful supply of water may be given, and it will be found that a little common salt, or, better still, saltpetre, will have a great effect upon the crop. It is essential that the surface of the bed be kept quite dark. If the bed be made in the open air, it may be necessary, after a time, to give to the spawn a fresh start, by placing a lining of hot manure around it; but on all occasions great care must be taken that the heat of the bed is not so excessive as to burn up the spawn. This, however, can never happen at a temperature of 75°; and when a bed is above this, no spawn should ever be inserted.

1180. *Sweet-herb Garden.*—A convenient spot in every kitchen-garden should be appropriated to the growth of such herbs as are necessary and useful for culinary purposes. With a little care and management, the herb-garden may be made not only useful, but ornamental also. It should, in general, be situated as near the kitchen premises as possible; and each kind of herb should have its own separate bed. If a square piece of land be set apart for the herb-garden, the beds may be arranged in some fanciful form, or separated by gravel walks, and having neat box or tile edgings. The most useful and best worthy of cultivation are the following:—Parsley, sage, thyme, mint, fennel, rue, basil, marjoram, balm, and rosemary.

1181. *Parsley* is best raised from seed, which should be sown in shallow drills, about four inches apart; and the plants, as soon as they are well up, should be thinned out to about four or six inches. It may be sown at any time from March to September, and takes about seven weeks in coming up. Curled parsley is the best, and great care should be taken to select seed from good plants. Parsley will be finest in a rich light soil.

1182. *Sage* will grow freely from slips, which may be taken in the autumn as soon as the plants have ceased flowering, or in the spring 6f the year.

1183. *Thyme* is easily increased by dividing the roots and planting out the pieces in a bed about four inches apart.

1184. *Mint* also grows from pieces of the roots, which spread with great rapidity; for every piece that shows a joint will grow. It requires a moist soil, and the bed in which it is placed should be inclosed with a string, brick or tile edging, as it is frequently very troublesome in running about.

1185. *Fennel* may be raised from seed in April or May. The seed should be covered lightly with fine mould; and, when the plants are strong enough, they may be set out in a bed about a foot apart. A good bed of fennel will last for years; but to insure fine leaves, the flower-stalks should always be cut off as soon as they appear, so as never to ripen seed.

1186. *Rue* may be propagated from cuttings or seed.

1187. *Rosemary* in the same way as rue.

1188. *Balm* may be increased by division of the roots; and so also may Marjoram.

1189. Any of these sweet herbs may be preserved for winter use by being cut when in full growth, and dried in the sun. They may then be kept tied up in bunches in a dry room, or rubbed down and bottled, which is far better.

1190. *To Blanch Endive.*—Place over each plant, when full grown, a large tile or slate, which will effectually exclude all light, and blanch the endive in a few days. Some gardeners tie the plants up with bass or twine, in the same manner as lettuces; but the plan is objectionable, as in wet weather the rain will run down the endive-leaves, and rot the hearts of the plants.

1191. *Vegetable-Marrows, Gourd, Pumpkins.*—All vegetables of this class, which produce an immense amount of food, may be profitably and easily cultivated by attending to the following directions:—The seed should be sown in April or May, in pots or pans of rich light soil, and raised in a warm frame. As soon as possible, the young plants should be potted off, and hardened in a cold frame for planting out in the end of May or early in June. Mr. James Cuthill tells us that marrows contain a rich sugary and farinaceous matter, and are a most excellent and nutritious article of diet when dressed in the following manner:—Cut the marrows into short pieces, take out all the pith and seeds, and boil them in plenty of water with a little salt. When well boiled, scrape out all the marrow, put it between two dishes, and squeeze out all the water; then mash it well, adding salt, pepper, and a little butter. It is then a dish fit for any table. The cultivation Mr. Cuthill recommends is to sow the seed about the first week in May in the open ground, in a warm corner, transplanted to moderately rich land. "I can grow," he adds, "twenty tons of the marrows to the acre easily; and, when ripe, they can be stowed away anywhere, and will keep good for a very great length of time. In addition to their utility as a vegetable for the table, they form a most excellent and economical article when boiled for fattening pigs."

1192. *The Grape Vine.*—It is certain that our moist and cloudy climate is not favourable to the ripening of the grape; its cultivation in the open air requires great care; and in many seasons the most skilful management will fail to bring it to perfection. Nevertheless, its graceful trailing habit and beautiful foliage render it highly ornamental on the walls of a house; and in that sense it is worth cultivating, with the prospect of some fruit in favourable summers. It is also certain that in former days vineyards of considerable extent were cultivated, some remains of which are still found in Gloucestershire.

1193. The vine is propagated by cuttings and by layering. Cuttings, made early in March or the latter end of February, may be planted about the middle of March. The cuttings must be shoots of last year, shortened to about 12 inches, or three joints each; and if they have an inch or so of last year's wood at the bottom, it will be an advantage. They may be planted either in nursery rows until rooted, or planted at once where they are to remain, observing in the latter case to plant them in a slanting direction, and so deep that only one eye or joint is above-ground, and that close to the surface.

1194. Vines are propagated by layering of the shoot of last year, or of a part of the branch, laying them about four or five inches deep and covering them with soil, leaving about three eyes above the ground; they are also layered in large pots, either by drawing the branch through the drainage-hole and filling the pot with soil, or by bending the branch and sinking it four or five inches in the soil and pegging it down there; it may then either be grown as a potted vine or, when fully rooted, transferred to its permanent place on the wall or vine border; in the latter case the soil of the border should be dug out for three or four feet, as directed for other wall-trees, a solid concrete bottom formed, with thorough drainage to carry off the water, and the border filled in again, first with bones and other animal remains, then with lime rubbish where that is available, and the surface with good loamy soil. In this soil the vine should be planted, the roots being previously trimmed and spread out horizontally, so as to radiate in a half-circle from the crown of the stem. Under such an arrangement as this the vine comes rapidly into bearing.

1195. When the vine is approaching this state, and the leaves have fallen, a general regulation of the shoots becomes necessary. In every part of the tree, a proper supply of last year's shoots, both lateral and terminal, should be encouraged, these being the principal bearers to produce next year's fruit. All irregular and superabundant shoots not wanted should be cut out, and with them all of the former year's bearers, which are either too close to each other or which are too long for their respective places. Where it is not desirable to cut out the branch entirely, prune the branch back to some eligible lateral shoot, to form a terminal or leading branch. Cut out also all naked old wood. The last summer's shoots thus left will in spring project from every eye, or bud, young shoots, which produce the grapes the same summer. The general rule is to shorten the shoots to three, four, five, or six eyes or joints in length, according to their strength, and cutting them back to half an inch, to about a quarter of an inch at every eye, the strongest branches being limited to five or six joints, except where it is required to cover a vacant space on the wall. When left longer, the vines become crowded, in the following summer, with useless shoots, and the fruit is smaller in consequence. This pruning should be performed early in spring, even as early as February,—pruning at a later period, when the sap has begun to ascend, the wound is apt to bleed when the thick branches have been cut off. A second pruning should be performed about the middle of May, when the grapes are formed and the shoot has attained a length of two or three feet: at this time pinch off the shoot about six inches above the fruit and nail it to the wall in such a way that the fruit may be in contact with it. About midsummer a third pruning should take place, when all the branches should be gone over and the fruitless branches, not required for next year's wood, removed. A vigorous vine will require a fourth and final pruning in August, when the long shoots from the previous stoppings must be shortened back again, and all leaves lying too much over the bunches of fruit removed; taking care to prune, however, in such a manner that there is always a succession of young branches advancing from the lower part of the stem properly furnished with bearers, as well as a sufficient supply of young wood to replace the old as it becomes unserviceable. The pruning finished, let the branches be nailed or tied neatly to the wall or trellis, laying them regularly six, eight, or ten inches apart. Vine-pruning may be performed any time during the winter months, when the weather permits; but the sooner the work is done the better. The young shoots of last year produce shoots themselves the ensuing summer; and these are the fruit-bearers, which are to be trained horizontally or upright, according to the design of the tree.

1196. In May the vines will shoot vigorously, producing, besides bearing and succession shoots, others which must be cut away, and bearing and other useful branches nailed or tied up close to the wall before they get entangled with each other; and all weak and straggling shoots, especially those rising from the old wood, should be cleared away. Much of this summer pruning may be effected by pinching off the young shoots with the finger and thumb while they are young and tender. This should be continued during June and July. Many small shoots rise, one mostly from every eye of the same summer's main shoots laid in a month or two ago: these must be displaced, in order to admit all the air possible to the advancing fruit. All new shoots whatever should now be rubbed off as they appear, except where they are required to cover the wall. In August, even these must be rubbed off, being utterly valueless even for that purpose. During this month, the fruit itself requires attention. Where the branches are entangled, or in confusion, let them be regulated so that every branch may hang in its proper position. All the shoots that have fruit hanging on them, or which are ranging out of bounds, may be stopped, and where the grapes are too much shaded during August and September, remove a few of the leaves which intercept the light and heat. They should now have all possible aids of the sun to enrich their flavour. It will be necessary now to protect them from birds, wasps, &c., by bagging the best bunches in gauze or paper bags. In October, the bunches are ripe to bursting, and ready to gather, preparatory to a new year of growth and decay; bearing in mind that success depends on well-ripened wood—a short-jointed branch, ripened shoot under an August sun, being a fruitful bearer of highly-flavoured fruit: for this purpose a light porous earth is preferable to more tenacious clay soils. When the bunches of grapes are formed, pinch off the leading point of the growing shoot one joint above that from which the bunch proceeds. This is done to check the tendency of shoots to overlap one another. After the young points have been stopped, each joint below the stopping will put forth a side-shoot. These are termed lateral shoots. While this close stopping limits the extension of the tree, the size of the berry is much increased. This stopping is continued till the stoning period commences. This process occupies six or eight weeks, during which the growth of the fruit remains stationary, and the leading shoots may be suffered to push wherever they may.

1197. During the swelling of the berry, the fruit begins to acquire flavour, and the buds plumpness and firmness. Henceforth they must have all the sunlight possible. To obtain this, all the lateral spray and others which shade the larger leaves must be stript away, leaving the larger leaves exposed to the sun; for the fruit receives its flavour through the agency of the leaves.

1198. Pruning varies with the fancies of the operator. *Spur pruning* consists of carrying up one leading shoot to the whole extent of the house or wall, either at one year's growth, or two or three, leaving spurs or lateral shoots to develop themselves at regular intervals on the stem. This is usually the result of three years' growth, the cane being allowed to make a third of the length of the first year, a second third the second year, and the remaining third during the third year. There will thus be five branches the first year, ten the second year, and fifteen the third year. The subsequent pruning is confined to pruning each of the laterals back to the last eye at the base of the shoot.

1199. *Long-rod Pruning* consists in establishing a stump with three strong branches or collars, from each of which, in its turn, a shoot springs, which, by a regular system of pruning, is worked in successive lengths, the one running the whole length of the rafter, the second half the length, and the third, recently pruned back, is to produce the renewal-shoot.

1200. Where the object is to cover a wall or house, the leading shoots are carried almost at random, the pruner selecting those which suit him, without heeding much, so long as they are short-jointed and strong, shortening back the renewal-shoots, according to the space they are to occupy, from three to six or eight eyes.

1201. *Sorts.*—Early Black ripens in July, in situations where the Black Hamburgs fail. Miller's Burgundy, known by its white downy leaf, is very early and hardy. White Sweetwater is an early sort, with a fine large berry, but sets badly. White Muscadine, excellent for all purposes.

1202. Black Hamburg ripens out of doors in fine seasons, but is very capricious in colour. White Frontignan is a fine early grape, sweet but insipid. Muscat of Alexandria requires artificial heat to ripen, but is one of the richest grapes in cultivation. West's St. Peter and the Cannon Mill Grape are both favourites for house-culture.

1203. Many expedients have been tried to expedite the ripening of the grape on open walls. The bunches have been put in empty flasks, run on tiles of the house roof, and trained on sloping walls: they ripen earlier in the flask, but acquire an insipid flavour; and sloping walls, while they catch more of the sun's rays, catch also all heavy rains. Nettings of muslin, sufficiently fine to keep out wasps and other insects in the ripening season, without intercepting the sun's rays, are, perhaps, the safest protection, unless a few movable sashes can be spared to cover the walls in cold and damp weather, and increase the radiation of heat.

§ 4.—KITCHEN-GARDEN.

1204. Many principal crops come in this month, and, following suddenly upon a time when the supply from the kitchen-garden is somewhat scanty, show the real effect of cropping too abundantly in the early part of the year. Peas, beans, cauliflowers, carrots, potatoes, and many other vegetables, come in all at once, that could not be produced earlier in the open ground. All show the propriety of dispersing the crops more regularly through the season. The young gardener should make a note of it, and endeavour to manage so that there is no flush of vegetables at one time and a dearth of them at others. Particularly let it be borne in mind that we have long cold springs, in which the weather is exceedingly variable and mostly ungenial, when vegetation makes very slow progress indeed; it is then that root-crops and brassicæ come in so useful; then that Brussels sprouts, kale, and broccoli, yield a succession of sweet wholesome sprouts, that grow almost in the coldest weather, and form the principal supply from Christmas to May. It is now the time to look forward to that time and be well prepared for it, so that available space should have been left, in which a plentiful supply of the above-named can be grown. Ground that has been lying fallow since the winter can now be turned to good account; and be it remembered that fifty firm stocky plants of broccoli will yield a better supply than a hundred plants that have been drawn up between other crops, or been crowded. This month being generally a dry one, the watering-pot must not remain idle; many kitchen crops will not do well if kept dry. Most kinds of salads are worthless if stinted of water; and as a rule, a judicious application of it will amply repay the time and labour; but let it be applied copiously, for mere surface-watering only attracts the roots to the surface, to be burnt up by the sun.

1205. *Asparagus.*—Water newly-planted beds, and keep clear of weeds. Beds in bearing will be benefitted by an application of liquid manure. Do not cut too closely, but leave a few heads to expand and communicate with the light of day.

1206. *Seakale.*—Thin out the crowns where they are anyways thick. A few strong heads are better than many weak ones: young seedlings will be benefitted by a sprinkling of wood-ashes. It being a marine plant, salt may be strewn between the rows. Keep the young plants well watered, and hoe frequently between.

1207. *Beans.*—The last sowing of these should be made for the season: they seldom pay for sowing later. Top those in bloom before they become infested with aphis. This pest adheres to the young tops; consequently, remove that, and the insects have no place suitable for them. If topped as soon as the first flower opens, the crop will be as large as if allowed to continue growing, and they set much earlier. Mulching will increase the quantity and quality of the crop.

1208. *Runner Beans* do well sown any time before midsummer. On light ground they may be dibbed in—an expeditious method. Some recommend soaking them in water for a day before sowing, which may be advantageous in hot, dry weather; but it is as well to water the drills or holes at the time of sowing. Those sown last month should be earthed and staked before they begin to run. This vegetable is often used by cottagers to form or cover an arbour, or fence, or screen, for which it is well adapted, except on account of its ephemeral character. Nasturtions may still be sown, being very quick at this time. Those already up should have their supports about four or five feet high.

1209. *Peas.*—After the second week this month, it is not advisable to sow strong growers. Before then such sorts as Ne Plus Ultra, British Queen, Knight's Tall Marrow, &c., may be sown to advantage; but after that it is best to sow such sorts as Auvergne, or Champion of Paris. The time from sowing to bearing is less, and proportionately certain of yielding a crop.

1210. *Celery* will probably be in condition for final planting towards the end of this month: the main crop had better be deferred till next month. Celery is generally considered a gross feeder, requiring a rich highly-manured soil and abundance of water. It certainly cannot be grown to perfection without both. In order to give it the best possible chance, it is usually grown in trenches from six inches to a foot deep. The trenches are marked out four or five feet apart, and the top spit thrown out, and also the loose soil. For single rows a foot will be sufficient, but for double rows the trenches must be 18 inches wide. Having thrown out the soil, put six inches of good rotten dung in the trenches, and fork it well into the bottom; if then left till a shower of rain, so much the better: for that reason it is advisable to get the trenches ready early. The plants should then be planted with a trowel, and well settled in with water, which must afterwards be used unsparingly. Another way is to plant on the level ground, it having previously been well manured and trenched. Plant 2 feet or 18 inches apart, to blanch it: when drain-pipes are used, the pipes should be filled in with sand. This being the cleanest method of growing celery, it is well worth adopting: a far greater number of plants can be grown on a given space than by the ordinary method. It is also an advantage that the plants can receive the benefit of rain and liquid manure after earthing up, which cannot very well be done in the ordinary way. But if by any chance the sowing was not accomplished in April or May, it may be done early this month, with every chance of success, by sowing some such large-growing sort as White's. This will get a moderate size by October; and as it is not desirable to have it over large, such sorts are as well deferred till late before sowing: those already up should be thinned as soon as possible, leaving the best-coloured plants.

1211. *Carrots.*—Thin without delay, but not too closely, as some are apt to run, even under the best culture. From nine inches to a foot is a good average. A succession may be sown any time before midsummer.

1212. *Onions* should receive a final thinning, allowing eight or nine inches for the main crop. Use the small hoe as often as possible, and keep them clean. Onions for salading may still be sown. A shady border on the north side of a wall will suit them. Tree-onions, potato ditto, and those planted for seed, will require some support. Drive a few stakes round them, and pass strings from one to the other, or tie to single stakes. If they are allowed to break down, they receive a permanent injury, and the yield is reduced or altogether prevented.

1213. *Leeks.*—Plant in deep drills, to admit of earthing up: give an abundance of water in dry weather. Soot dredged over them will stimulate them, and prevent the attacks of insects in a great measure.

1214. *Potatoes.*—Earth up before they get too tall, but leave the top of the ridges nearly flat, so that the tubers are not buried too deeply. It is a great error many fall into of drawing the earth as high as possible up the stems. They do not bear so well, from the greater exclusion of air from the roots. Potatoes that have been retarded may be planted this month: they will yield new potatoes in the autumn.

1215. *Turnips.*—Sow a good breadth of these—they will come in well and be very useful in the autumn. Sow immediately after rain, or, if the ground is light, immediately after digging. They grow very quickly; but some slight protection from birds will be necessary the short time they are germinating. White worsted will generally be found efficient. Tread the seed in well, or use the wooden roller after sowing, but finish off with a rake.

1216. *Scorzoneras, &c.*—Thin to about 10 inches or a foot, and stir the ground well between them.

1217. *French Beans.*—Sow a few rows of these for succession. There are many varieties; but it is immaterial what sort is sown, except on the question of flavour or productiveness. I consider the larger-growing sorts are the best to sow now. The Royal Dun, the Negro and Cream-coloured, &c., unlike dwarfer sorts, continue in bearing a long time. Thin to four or six inches, and earth up, but give no manure.

1218. *Lettuce.*—Sow on a north border, but plant in an open situation. It is necessary to sow often to insure a succession. Water the ground thoroughly, or not at all: surface-watering is very injurious.

1219. *Endive* may be sown this month, as it is less likely to run now than formerly. This seed grows very quickly, and birds do not seem to care about it; it may therefore be merely sown broadcast, trodden, and raked. Plant out early to insure a good curl in the leaf.

1220. *Vegetable Marrows and Pumpkins* should be got out early this month. If good strong plants, they may be merely planted on a sunny border; but they are much better for having a little dung-heat; or dung without heat will suit them, for they delight in a loose bed of light but well-rotted dung that they can root into easily. Give plenty of water if the weather holds dry.

1221. *Capsicums and Tomatoes* the beginning of this month.—Plant these against a south wall if possible—otherwise against a sloping bank. The full sun is necessary to induce these to bear well—under and between wall-trees, where there may be any vacancies, are well filled up by them.

1222. *Cress.*—Sow American and Normandy for succession.

1223. *Broccoli.*—Defer not later than the middle of this month the final sowing of late sorts. Walcheren sown now will very likely come in during the winter. Plant out those that are ready, and never allow them to draw up in the seed-bed; but prick them out temporarily: they will pay for it. If there is no room for them otherways, transplant in drills made for the purpose.

1224. *Brussels Sprouts, Borecole, and Savoys.*—Get these planted for good as early as possible; planting in drills two feet apart, and water freely. Puddling the roots in clay and soot mixed in water may be good for them and prevent clubbing in a great measure. Plant between rows of peas and beans that will soon be off the ground—no matter how firm the ground is. Judging from my own experience, this group do best if the ground has not been dug for several months before planting. Watering once a day or oftener will be necessary in dry weather.

1225. *Cabbage and Cauliflower* should also be planted out when strong enough. The latter will prove very useful in August and September. A succession of these is an important matter.

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§ 5.—The Fruit-Garden.

1226. The occupants of the fruit-garden will be either dwarf standards, apples, pears, cherries, or plums, espaliers or pyramids, all of which have undergone a special course of training and pruning suitable to their habits; or peaches, nectarines, and apricots, on the walls, with the usual arrangements for bush-fruit; and the skill of the gardener is now best displayed in selecting the shoots to be retained or encouraged for extending the trees. They should be short-jointed and brown-coloured, and should now be stopped and laid in. Where the leading shoots of *peaches* or *nectarines* are growing too vigorously, stop them, in order to encourage lateral shoots, by pinching off the leading bud. Unless this operation is performed early in the season, the shoots do not get properly ripened. If the fruit seems setting too thickly, let it be partially thinned, reserving the main thinning, however, till after it has stoned. The trees will have been mulched last month to prevent evaporation, and should now be watered, and that so copiously that it does not require frequent repetition, pouring the water into the roots. *Apricots* will now require their final thinning, and stopping, and watering, also followed by mulching, which is important at this time for all fruit-trees where evaporation is active.

1227. The beginning of the month is a busy period in this department, and much vigilance and perseverance will be requisite to keep pace with the advancing growth, in preventing and keeping down the different pests. Tobacco-water must be instantly applied, directly the black or green-fly makes its appearance, endeavouring to make it act on the under-side of the leaves. When the foliage becomes curled, insect larvæ are present: a good sulphurator, charged with snuff and a small portion of sulphur, will be found the most effectual implement. Before using this, damp the trees with the syringe, and apply the snuff before the tree becomes dry, that it may more effectually adhere to the leaves. Dislodge the maggot, which coils itself up in the foliage, and not unfrequently spoils some of the finest fruit. In disbudding pears, plums, and cherries, [the fore-right shoots, and those not wanted for laying on, should remain for the present, as stopping them at this time would only cause a fresh breaking into wood, either of the eyes at the base of the stopped shoot, or some portion of the spurs; as they, however, look unsightly on well-regulated trees, it will be better to tie them slightly to the main branches for the present: this will give a better appearance to the trees, and bending the shoots will in some measure stop the over free flow of the sap, and so help the object in view. The precise time at which shoots should be shortened must be regulated according to the vigour of the tree, and should be deferred till all danger of the remaining eyes again breaking into wood is over. Cherry-trees now progressing towards maturity should be gone carefully over, the shoots stopped and laid in, and the trees netted, to save the fruit and protect it from birds. If the black-fly appears, cut off the ends of the shoots, unless it is more convenient to wash them in tobacco-water.

1228. Where a large number of strawberries are yearly forced, the plants after the fruit is gathered will be found valuable for planting out, producing a most abundant crop the following year: the later-forced ones will answer best, as they are not so liable to bloom again in the autumn. Turn the plants into rich soil, and if they are only to remain one year, they may be planted pretty thick: water them till they get established. Place straw or some similar material between strawberries now in bloom, to preserve the fruit clean in heavy rains, and to keep the ground moist. To grow this fruit in perfection, it is necessary to keep the roots moist while it is swelling, either by mulching, which prevents evaporation, or by watering, when it is necessary to give a liberal supply. To accelerate the ripening process, lay some pieces of slate or tiles under some of the best fruit. Where expense is no object, tiles may be obtained cut so as to join round the roots of the plant and fit together;

but their light colour and greater porosity increase evaporation, and slates are preferred; and where they are not obtainable, straw or coarse hay (not lawn-grass) will retain the heat and moisture, and keep the fruit free from grit. Alpines and other late sorts should have all the flowers pinched off this month.

1229. This is a fruit requiring very careful packing when sent to a distance. When hampers are to be sent, the fruit should be packed in smaller baskets, with lids, five or six inches square, which will pack conveniently in the larger hamper. Having placed some young strawberry-leaves in the bottom and round the edges of the basket, fill up the remaining space with fruit and leaves alternately,—not in layers, but intermixed with the fruit, and cover the top with leaves, over which place the lid. The fruit selected for packing should never be over-ripe, and all bruised berries should be thrown out.

1230. A wash of lime- or clear soot-water may be applied with advantage to gooseberries and currants infested with the caterpillar. These increase so rapidly that a constant watch must be kept up for some time. The earth immediately under the trees should be watered and beaten firm, which will prevent more of the larvæ from rising to attack the shoots. Where the earth is very light, a coating of clay or loam, the consistence of mortar, should be spread under the trees, and made firm to prevent their escape from the earth. If these precautions are taken on the insects' first appearance, they are more easily kept from doing mischief. Pinch back all shoots off the currant-trees not wanted for wood. The fruit of gooseberries will be considerably improved by summer-stopping the young wood.

1231. *Figs.*—Stop all except the leading shoots when they have made three or four joints, and lay on leaders and shoots required for filling up. Watering the roots with soap-suds is found greatly to benefit the fruit.

1232. *Vines* will require going over. Thin out what wood is not wanted for bearing, and stop the bearing-shoots at one joint above the shoot: nail in the leading shoots close to the wall. Where the long-rod system of pruning is adopted, a shoot must be selected and carried up from the bottom of each stem, to furnish bearing-wood for next year. By careful attention to the vine-border and to pruning, the vine on open walls may be made much more productive, as well as ornamental, than it usually is.

1233. Remove useless suckers from raspberry plantations, to admit more sun and air to the fruit. Begin to layer strawberries in 60-pots directly runners can be obtained for next season's forcing. Let the soil used be rich and rather light, to encourage the runners to root freely: when layered, do not let them suffer for want of water.

§ 6.—CULTURE OF FLOWERS UNDER GLASS.

1234. *Conservatory.*—The difficulty of furnishing the conservatory is now one of taste and selection. Every floral tribe will now be ready to furnish its quota, and discrimination only is required in selecting and arranging them.

Avoid crowding; encourage variety and harmonious contrast in colour; remove all decayed or decaying blossom, and guard against insects of all kinds by cleanliness and timely fumigation. Regulate the luxurious growth of creepers and border-plants, watering copiously, occasionally using liquid manure.

1235. Ventilation is now of the utmost importance. Air should be admitted night and day, except in cold gloomy weather, and shading from the burning sun attended to for an hour or two daily.

1236. Large orange-trees grown for the flower-garden or grounds during the summer months may now be moved to the places they are to occupy. If they have been kept cool and airy, they will not have commenced their new growth, which should not take place till they are out of doors. Examine the roots to see that the drainage is perfect, and that in watering the water passes freely through the ball. They should have a free sunny exposure, but protected from high winds. Keep a damp growing heat to camellias and azaleas making wood: the latter are very liable to become infested with thrips, which can only be kept down by fumigating with tobacco alternate nights for a week, and syringing at the same time with diluted tobacco-water, until the appearance of the pest is gone. The utmost vigilance will now be required in keeping the more choice plants in a healthy growing state, and at the same time preserving the proper uniformity of growth to insure perfect and well-bloomed specimens. The precise time when the active growth should cease, and its energies be directed to maturing the current year's wood, can scarcely be laid down as a rule—the habit of the plant must be taken into consideration. It will, however, be safer, in general, to get the wood of delicate plants especially ripened early; for though they may not get to be such large plants, they will be better able to resist the attacks of mildew in the ensuing winter, and the disposition to form bloom-buds is always greater in plants ripening their wood early. Young plants growing into specimens, and where for a year or two bloom is no object, may, after their first growth is over, and being allowed a month's rest (during which time keep them rather dry), be started into growth again, giving them a larger pot, if such is necessary, and paying the same attention to the second growth, by stopping, training, &c., as directed for plants in general. Orchids will now be making free growth, and as solar light and heat are approaching the maximum point, an atmosphere humid in proportion must be maintained. The paths, walls, &c., should be frequently damped on bright days, and the plants gently dewed over once or twice daily. Air may now be given more liberally, moderating its admission, however, so as to prevent strong currents of air blowing on the plants.

1237. *Chorozemas* are a most interesting genus of plants from Australia, which bloom almost the whole year, more especially in the winter and early spring, and are consequently most acceptable additions to our greenhouses and conservatories. They are not very difficult to manage, and are alike useful for decoration and as cut flowers for bouquets, at a time when such flowers are valuable. They delight in a rich turfy peat, mixed with fibrous loam and leaf-mould and gritty sand. When recently potted, they require a close pit or the warm part of a greenhouse, and cautious watering at the roots, until they get into free growth. When thoroughly established, water with clear liquid manure twice a week.

1238. Chorozemas are propagated by cuttings of the half-ripened young wood, taken off in July or August, taking the short, stiff, and weak or medium growth, but avoiding twigs of a robust habit. These, after being trimmed, should be about one inch long, and must be inserted in sand, under protection of a bulb-glass. In preparing the pots for the cuttings, take care to drain thoroughly, by half filling them with potsherd; then place fibrous peat about an inch deep over the drainage, and fill up with clean sand. After the cuttings are in, place the pot in a close cold-frame, water when necessary, and wipe the condensed moisture from the inside of the glass twice or thrice a week. Here the cuttings must remain until they are cicatrized, when they may be removed to a warmer situation, and the pots plunged in a very slight bottom-heat, and in a few weeks they will be ready to pot off. If it is late in the season before the cuttings are ready to pot off, they should remain in the cutting-pot through the winter, and be potted off in February; but if they are ready for single pots in September, they will be much benefitted by being potted off early.

1239. If you have selected dwarf, healthy, bushy, well-rooted specimens, prepare the following compost:—Rich fibrous peat, two parts; leaf-mould, one part; rich turfy loam, two parts; clean potsherd and charcoal, broken to the size of horse-beans, one part; with sufficient gritty sand to make the whole when mixed light and porous. Having prepared this compost, examine the roots of the plant, and if they are strong and healthy, prepare a pot two sizes larger, and proceed to pot the plants, placing some of the roughest part of the compost over the drainage, and fill up with the finer soil.

1240. After potting, place them in a close frame or pit, taking care to ventilate freely; but keep a moist atmosphere, and shut up for an hour or two every evening, and open it again before retiring for the night. Attention must be paid to stopping the rude shoots, so as to induce close, compact, and healthy growth. If the plants progress as they ought to do, they will require a second shift during the season. The plants should be kept growing until the winter fairly sets in, at which time they should be brought to a state of rest. In the second year some of the plants will produce a nice head of bloom; but in order to produce rapid growth, remove the bloom-buds when quite young, and keep the plants vigorously growing through the second season. If the plant is in good health and the pot full of roots, a shift any time between Christmas and October will not hurt it; but never shift a plant until the pot is full of vigorous roots, and take especial care that the roots do not become matted before you shift.

1241. Manure-water in a weak state may be used with advantage; but use it with caution, and not more than twice a week. That prepared from sheep's dung and soot is best, and it *must* be used in a perfectly clear state.

1242. Chorozemas are subject to attacks of red-spider and mildew. The best remedy is sulphur-and-water vigorously and plentifully supplied. Take a plant and lay it on its side in the open air, then with the syringe wash it thoroughly: after watering, dust it with sulphur, and repeat the dressing until the pest is destroyed.

1243. The following are some of the most distinct and beautiful of the series which are met with in cultivation:—

C. angustifolia,—a remarkably graceful shrub, with long, slender, and somewhat scrambling stems, having linear acute leaves with recurved margins, and racemes of pretty flowers, of which the standard is orange-yellow, and the wings crimson-purple. Flowers in March and April. New Holland. Introduced 1830: formerly called *Dillwynia glycinefolia*.

C. cordata,—an elegant dwarf shrub, with many slender branches, clothed with sessili-cordate, obtuse, spiny-toothed leaves, and bearing the flowers in more or less drooping racemes. They are orange in the standard, with scarlet or crimson wings, sometimes scarlet with purple. Flowers in March and April. New Holland. Introduced 1836.

C. Dicksoni,—a handsome dwarf bushy-growing shrub, furnished with narrow leaves, and bearing a profusion of beautiful dull scarlet and yellow flowers. Flowers in March to May. New Holland. Introduced 1836.

C. flava,—a very pretty and distinct form for the cultivator. It is of erect, slender habit, with elongated ovate leaves, sinuate, toothed on the margin; the teeth spiny: the flowers are in racemes, the standard deep clear yellow, the wings much paler or lemon-colour. Flowers in March and April. New Holland. Introduced about 1848.

C. ilicifolia,—a diffuse-spreading shrub, with oblong, lanceolate, pinnatifidly spinous leaves, and bearing scarlet flowers; the standard marked with yellow at the base. Flowers from March to August. Introduced 1803.

C. Henchmanni,—a hairy shrub, with short twiggy branches, covered with needle-shaped leaves, and bearing numerous axillary racemes of flowers of a light scarlet, with a yellow mark at the base of the standard. Flowers from April to June, and sometimes till September. Introduced 1825.

C. ovata,—a handsome shrub, with weak ascending winged stems, furnished with ovate-acute leaves, and bearing short racemes of showy flowers, usually scarlet, with crimson wings. Flowers from March to May. Introduced 1830.

C. spectabilis,—a very beautiful small shrub, with slender, twining or scrambling stems the leaves of which are elliptic, lanceolate, obovate, or cuneate, and the flowers pale orange in the standard, tinged with crimson; the wings being crimson: they grow in long drooping racemes. Flowers from April to July. Introduced 1839.

C. triangularis,—a beautiful dwarf spreading shrub, of branching habit, with subhastate leaves, pinnatifidly spinous on the margin, and the flowers in short racemes, the standard scarlet, the wings purple. Flowers in March and April. Introduced 1830.

C. varia,—a dwarf compact-growing species, with variable leaves; in some forms broadly ovate, toothed, and spiny on the margin; in others almost entire, and sometimes nearly round in outline. The flowers are very numerous, in short racemes, large and showy, usually orange with crimson wings. Flowers from April to July. Introduced 1837.

The variety called C. varia nana, of remarkably dwarf habit, is the best for a limited collection, though there are two or three other very distinct and beautiful forms.

1244. Shade regularly in bright weather, placing such plants that bear a pretty free exposure to the sun's rays in the lightest part of the house. Make it a rule to examine plants in baskets, &c., that the necessary dampness of the growing material may be uniform, for nothing tends more to check the growth of orchids than want of attention to this in the growing season. Pharus, zygopetalums, cyrtopodiums, and other terrestrial genera, will be benefitted by being plunged in bottom-heat during the season of active growth.

1245. About the second week, conservatory and stove climbers will require attention to keep the current year's shoots within proper limits. Avoid anything like formality in arranging the branches. If at the winter regulation of the plants, the main shoots were trained to occupy the desired position, the young wood may be allowed considerably to follow its natural mode of growth, if this does not create confusion, which is equally as much to be guarded against as a strict formality. Hardenbergias, Kennedyas, &c., may slightly be cut back, after blooming, to induce a new growth. Water should now be given liberally to plants in the open borders of the conservatory, excepting, perhaps, plants very recently planted. Shade daily when necessary, and ventilate in proportion to the state of the external air. The stock of balsams and other annuals grown for filling the vacant places in the greenhouses, &c., should be encouraged by frequent shifts: keep them in bottom-heat, and near the glass; pick off the early-formed bloom-buds, as the plant should attain a considerable size before being allowed to bloom. Kalosanths continue to train neatly, and water with liquid manure occasionally. Specimen scarlet geraniums should likewise have liberal encouragement to grow them on. Common and fancy pelargoniums for late blooming will thrive better in a somewhat shady situation, and (the latter especially) where they can at the same time be protected from heavy rains. Fumigate whenever green-fly appears; for, if suffered to get the upper hand, it soon disfigures the plant. Fuchsias, if not in their blooming-pots, should be potted at once. Train in the desired form, and pinch back weak and straggling shoots. The glass must be taken entirely off Japan lilies, gladioli, &c., unless very early blooms are desired. Keep a portion in the shade of a north wall for a succession of bloom. Take care the plants stand on a bottom carefully prepared to prevent worms getting into the pots. The more tender kinds should be placed under a slight frame-work, with oiled canvas or tarpauling attached, to protect them during heavy rains. When the greenhouses are thus partially covered, a portion of the more hardy stove-plants may be introduced. This exposure, during the hot months of summer, to a large portion of air, will benefit the growth of many soft-wooded plants, particularly of such as are being grown for blooming late in the autumn.

1246. Plants, when placed out, should be plunged in ashes, or have the space between the pots filled with moss; and those plants in the house which have their pots most exposed should be inserted in larger ones, and the space filled with moss, sawdust, &c. This will prevent excessive evaporation from the soil containing the roots, through the sides of the pots, and will save many plants from being lost during very hot weather. Stove-plants should be closely watched (particularly those with large soft leaves) for the red spider, which is encouraged by dry weather. Syringe frequently to keep them in check, and plants much infested with them should be dusted over with dry sulphur by the sulphurator. Let the sulphur remain on the plants for a day or two, carefully shading them from the sun, and, if possible, keeping them in a close place; particular care should likewise be taken in supplying this class of plants regularly with water: a short supply causes the leaves to get flabby in dry weather, and the plant is sure to be laden with the red spider. Specimens and choice plants nearly done blooming should have the faded blooms picked off, and be well washed with the syringe; they should be placed in a cool shady situation to recover themselves before potting, which, as before advised, should on no account take place until a fresh growth has commenced. Shading will be necessary to all descriptions of plant-houses, unless the roofs are covered with creepers; paths, floors, &c., keep damp by throwing water over them, to preserve something like humidity in the atmosphere of the house, which, under the extreme dryness of the external air, is extremely difficult to keep up. Achimenes, gesnerias, gloxinias, &c., as they begin to show for bloom, should be moved to more airy quarters, keeping them, however, partially shaded for a time. Achimenes must be carefully attended to with water while growing.

1247. At the latter end of the month, as the solar light will be approaching the maximum point, and solar heat nearly so, fires may be discontinued in the orchard-houses except on the evenings of wet days, when a little fire will be necessary to allow of admitting air freely in the morning. As plants at this season will be making way fast, air must be admitted liberally, which, in conjunction with light, will help to arrest the rapid growth of those plants whose disposition to bloom mainly depends on a free exposure to both at the same time. Remove to houses with a north aspect, or under the shade of a north wall, any plants whose period of blooming it is desirable to prolong. Place in their blooming-pots the principal stock of chrysanthemums, using for potting a rather heavy loam with a portion of well-rotted cow-dung.

1248. Seedling Chinese primroses, cinerarias, and other plants required to furnish the winter supply of bloom, should now be forwarded by shifting into pots. Keep them in a cool frame where a slight shade can be given them in hot weather, or else turn the frame to the north. Look to the stock of plants out of doors in showery weather, to see they are not suffering from imperfect drainage. Throw screens over delicate plants during heavy rains, especially such as have been recently potted.

1249. At the end of the month, Chinese azaleas and camellias intended to bloom early next season, and which have by this time nearly completed their growth, should be exposed to more light and air, to harden their wood before setting them out of doors. As soon as the wood is somewhat firm, and the buds for next season make their appearance, is a favourable time for repotting such as require it, and if caution is used to prevent exciting them into a second growth, the blooms will be finer than when the plants are potted before the years's growth commences. Plants intended for forcing should on no account be over-potted at any time, and both camellias and azaleas are often shy of bloom when forced after a large shift; another advantage in keeping plants for forcing rather under-potted, is that they are often required to be turned out of their pots to fill vases, tazzas, &c., in the drawing-room, when in bloom, which can be done without much injury to plants when they have completely filled their pots with roots.

1250. *Ericas or Heaths.*—This important genus of greenhouse plants, which includes five or six hundred described species, and as many varieties produced by cultivation, are the great ornaments of the greenhouse at a time when other flowering plants are scarce ; it is therefore impossible to overrate their importance, even were their delicate flowers less beautiful than they are. The genus has, moreover, the advantage of furnishing plants which flower summer and autumn, as well as in winter and spring.

1251. Heaths are propagated by cuttings formed of the tender tops of the young shoots. The cuttings should be an inch or so in length, and should be tenderly used, so as to avoid bruising any part of the stem, and inserted in pots or pans filled with pure white sand, moistened and firmly pressed down. Having inserted the cuttings, water so as to settle the sand about the roots, and having given a little time for the moisture to subside, cover them with bell-glasses, pressing the edges into the sand so as completely to exclude the air, only removing the glasses to wipe off accumulated moisture. They should then be placed in the propagating-house, where there is one available, or in a spent hotbed. When they begin to root, which will be seen by the starting of the shoots, they should have air given daily to harden them preparatory to the removal of the bell-glasses.

1252. The soil best adapted for this plant is that obtained from a locality where the wild heath grows luxuriantly, taking care it is not dug too deep: the turf must not exceed four inches,—less rather than more ; as, if deeper than that, it is more than probable that the good and nutritious upper soil will become deteriorated by an admixture of inert and mischievous subsoil. The summer is the proper season to procure and store up a heap which may safely be used after having a summer and winter's seasoning.

1253. The next matter of importance is the selection of healthy, dwarf-growing, robust plants, taking care to avoid anything like meagre, leggy, stunted plants, which might live for years, but give nothing but disappointment to the cultivator.

1254. To prepare the soil for potting or shifting, it should be cut down from the heap so as to disarrange it as little as possible, breaking the lumps well with the back of the spade, and afterwards rubbing the soil through the hands, which is far better than sifting, as it leaves more of the fibrous decomposing vegetable matter in it; add to this one-fifth good white sand, and well incorporate the two together.

1255. To convert a plant into a handsome well-grown specimen in a moderately short space of time, they must have a liberal shift. A young plant in a 60 or 64-sized pot may be shifted into a 24 or 9-inch pot, taking care that plenty of potsherds are used for drainage. Care must be taken that the soil is thoroughly mixed, by pressing with the fingers in the fresh pot all round the ball of the plant, so as to make it quite firm and close. After being set away in a cool frame or pit, let them be well watered. This is much facilitated by placing a convex potsherd over it, and watering with a spout, leaving the water to diffuse itself equally over the whole soil, which is a means of avoiding what often occurs from watering with a rose,—viz., the surface only becoming moistened, while the ball remains imperviously dry. The following is a list of the best kinds to select for spring, summer, and autumnal flowering :—

Spring-flowering Heaths.

Aristata, or Horned, — flowering from March to August; dark-purple and white; 18 inches high.
,, major.
Andromedæflora,—flowering from March to August; rose-colour; 2 feet high.
Arbuscula,—a small heath of Sicily, bearing a red flower from February to August; 12 inches high.
Colorans,—whitish red; flowers in May; a greenhouse evergreen shrub.
,, superba.
,, blanda.
Denticulata,—purple; flowers in April; a greenhouse evergreen shrub.
Exsurgens,—dark orange; flowers in May; ditto.
,, coccinea.
Ferruginea, — red; flowers in May; a greenhouse evergreen shrub.
Floribunda,—pale pink; flowers in May; ditto.
Florida campanulata, — red; flowers in May; ditto.
Gracilis,—purplish red; flowers in March; ditto.
Grandinosa, or Hailstone,—a pretty heath, with white flower; in March and April; 6 inches high.
Hiemalis.
Humeana,—pink; flowers in March; a greenhouse evergreen shrub.
Incarnata,—pale red; flowers in March; ditto.
Lambertiana,—a delicate heath; flower rose and white; from May to August; 12 inches high.
Linnæana,—ornamental greenhouse shrub, of delicate habit, 18 inches high; purple and white; January to May.
Linnæoides,—linnæana-like heath; Feb. to May; 18 inches high, and purple and red.
Metulæflora,—orange; flowers in April; a greenhouse evergreen shrub.
Mirabilis,—purple; flowers in May; ditto.
Mutabilis, — crimson; flowers in May; ditto.
Neillii.
Persoluta rubra,—red; flowers in March; a greenhouse evergreen shrub.
Pyramidalis, — pink; flowers in March; ditto.
Rubra-calyx.
Sanguinolenta,—a pretty heath, flowering May to July; flower crimson and red; height 9 inches.
Sebana lutea,—yellow; flowers in May; a greenhouse evergreen shrub.
Sindryana.
Smithiana (Smith's heath),—flowering in April and May; bears a purple flower; height 2 feet.
Sparsa (scattered),—flowering in April; flower purple; 18 inches high.
Tenella,—a delicate heath; flower purple; May to August; 2 inches high.
Transparens,—white; flowers in May; a greenhouse evergreen shrub.
Vernix.
,, coccinea.
Westcottii.

Summer-flowering Heaths (June to August).

Aitoniana,—whitish purple; flowers in August; a greenhouse evergreen shrub.
,, turgida.
Ampullacea major,—whitish red; flowers in June; a greenhouse evergreen shrub.
,, rubra.
,, elegans.
Bandoniana,—purple; flowers in July; a greenhouse evergreen shrub.
Banksiana purpurea,—purple; flowers in June; ditto.
Beaumontiana,—purple; flowers in June; ditto.
Bergiana,—purple; flowers in June; ditto.
Carniula,—purple; flowers in August; ditto.
Cavendishina.
Clowesiana.
Depressa, — yellow; flowers in July; a greenhouse evergreen shrub.
,, floribunda.
Elegans,—green; flowers in August; a greenhouse evergreen shrub.
Eassoniana.
Eximia,—scarlet; flowers in June; ditto.
Fastigiata,—white; flowers in July; ditto.
Favoides elegans.
Florida,—red; flowers in July; a greenhouse evergreen shrub.
Hartnelli,—purple; flowers in July; ditto.
,, nana.
Inflata,—whitish red; flowers in July; a greenhouse evergreen shrub.
,, rubra.
Irbyana,—whitish green; flowers in August; a greenhouse evergreen shrub.
Jasminiflora alba,—white; ditto; ditto.
Jasminoides.
Jacksonii.
Laurencenana.
Longipedunculata,—pink; flowers in July; a greenhouse evergreen shrub.
Mammosa,—purple; flowers in August; ditto.
,, major.
M'Nabiana.
Massoni,—red-green; flowers in August; a greenhouse evergreen shrub.
Metulæflora bicolor.

Mundula,—purple; flowers in June; a greenhouse evergreen shrub.
Murrayana.
Nitida,—white; flowers in August; a greenhouse evergreen shrub.
Ollula,—pink; flowers in June; ditto.
Ovata,—purple; flowers in June; ditto.
Picta,—orange-yellow; flowers in July; ditto.
Princeps,—scarlet; flowers in June; ditto.
,, carnea,—flesh; ditto; ditto.
Propendens,—purple; flowers in July; ditto.
Regerminans,—red; flowers in June; a greenhouse evergreen shrub.
Retorta,—pinkish white; flowers in June; ditto.
,, major.
Rubens,—dark red; flowers in July; a greenhouse evergreen shrub.
Sanguinea,—crimson; flowers in August; ditto.
Spannoniana,—whitish purple; flowers in June; ditto.
Splendens,—scarlet; flowers in July; ditto.
Sprengelii,—yellowish purple; flowers in June; ditto.
Templeana,—2 feet high; flowering in July and August; flower red and purple.
Tortiliflora.
Tricolor,—red-green; flowers in June; a greenhouse evergreen shrub.
,, Dumbariana.
,, elegans.
,, Wilsoni.
,, ,, superba,—pink; flowers in July; a greenhouse evergreen shrub.
,, ,, coronata.
Vasæflora.
Ventricosa,—flesh; flowers in June; a greenhouse evergreen shrub.
,, coccinea,—scarlet; ditto; ditto.
,, ,, minor.
,, Bothwelliana.
,, grandiflora.
,, splendens.
,, hirsuta,—flesh; flowers in June; a greenhouse evergreen shrub.
,, alba,—white; ditto; ditto.
Vernoni superba.
Vestita alba,—white; flowers in June and August; a greenhouse evergreen shrub.
,, ,, grandiflora.
,, coccinea,—scarlet; flowers in June; a greenhouse evergreen shrub.
,, rosea,—light red; flowers in August; ditto.
Webbiana.
Westphalingia.
Wilmorei,—pink; flowers in July; a greenhouse evergreen shrub.

Autumn and Winter-flowering Heaths.

Archeriana,—dark scarlet; flowers in September; a greenhouse evergreen shrub.
Bowieana,—white; flowers in October; ditto.
Cerinthoides; dark scarlet; flowers in September; a greenhouse evergreen shrub.
,, stricta.
Gracilis cernua.
Infundibuliformis,—pale red; flowers in September; a greenhouse evergreen shrub.
Sebana rubra.
Taxifolia,—purple; flowers in September; a greenhouse evergreen shrub.
Vernix ovata.
Verticillata major,—scarlet; flowers in September; a greenhouse evergreen shrub.

1256. From this list varieties may be selected that will furnish plants for the whole year. Heaths like plenty of air: it must be given freely, but carefully, as, from exposure to the dry, arid, cutting winds, plants that are growing freely are apt to get a rustiness that will so disfigure them that months will elapse before they are free from it. With respect to plants growing in the heathery, or other house, during the continuance of cold winds, the doors to the eastward should be closed, and air admitted sparingly from the front sashes, taking care to let down the top-lights so as to insure a free circulation of air. When the plants are of free growth, and the weather is of a parching character, it will be necessary to look over them every day, and water freely, taking care that none be allowed to suffer for want of it, which at this stage would prove destructive to the flowering of the plant, if not its life.

§ 7.—FRUIT-CULTURE UNDER GLASS.

1257. Supposing a crop of grapes to have been gathered from early-started vines, it is still very important to keep the foliage in a green and healthy state for the next two or three months, when they shed them. This should be so done, however, as to prevent a second growth taking place; the borders should be gently watered, the red spider kept down by using the syringe, and air given on every possible occasion: the leaves may thus be kept in a healthy state, highly useful to the vine while it ripens its wood. By this means, vines endure early forcing for many years, without much diminution of their energy. Where vines have been retarded for late grapes, by being turned out, they should now be brought into the house and trained to the trellis or rafters, and invigorated by syringing, to encourage the growth of young wood.

1258. Houses where the grapes are ripe should be kept dry, and succession crops encouraged by a little heat, according to their several stages. Although the nights are now getting warm, it will still be necessary to apply artificial heat, both in houses ripening and in later crops now in bloom, especially where Muscats, West's St. Peter's, and other shy setters are grown, as they rarely form perfectly-shaped bunches without a warm and dry atmosphere, which in our climate requires fire-heat. Stop all lateral shoots in the succession-house after thinning the crop, that nothing may interfere with the swelling of the fruit. As the season advances, air must be given in abundance, the ventilators being left partially open by night. To prevent the atmosphere from becoming too dry during hot weather, keep the floors, interior walls, paths, and pipes, damp by sprinkling several times a day. This will also assist to keep in check the ravages of the red spider. Where new vine borders have been made in the spring, the present is a favourable time for planting if the vines have been started sufficiently long to have a shoot of moderate length. In planting, liberate the roots freely, and spread them in the direction of the border, giving a slight watering, and mulching the surface. The house should be kept rather closer for a few days, shading the newly-planted vines, if disposed to flag, until they show indications of starting, when the usual routine must be followed, preserving the young vines from injury by tying and training the leader up the roof.

1259. When grapes require to be kept for some considerable time, they must be shaded during bright weather, otherwise the fruit will become shrivelled. If the shoots have been stopped at one or two joints above the fruit, the laterals (which should be taken clean out up to the bunch) should be stopped back to one joint, unless the previously-formed leaves are already sufficiently close together, when they should be stopped close back. All after-growths are injurious when not required for shade.

1260. As the crops are cut, let the vines be cleaned and syringed, to destroy any red spider established since the ripening of the crop: they may be easily eradicated now. Both inside and outside borders will require water occasionally. Admit air freely at all times. The object now is, by careful management, to preserve the foliage in a healthy state for the next two months, that a supply of properly-elaborated sap may be stored up for next season. In thinning the later crop of grapes, lay out the bunches well, and leave the berries thinner than the early ones: the grapes will keep all the better from not being too thickly set in the bunch. Muscats and St. Peter's will require constant fires to set their fruit freely.

1261. Vines training in pots for next season's fruiting require daily attention and stopping: when they have attained a proper length required for fruiting, stop the laterals and expose the principal leaves to the light. Water with liquid manure when the pots are full of roots.

1262. *Pinery.*—The principal crop of summer pines, now swelling their fruit, must be encouraged by frequent waterings, using liquid manure alternately. Support each fruit in an upright position, and remove useless gills and suckers, reserving only sufficient of the latter for stock. Shade with some light material during the middle of bright sunny days, unless vines are grown over them; bearing in mind that the more light they get the better will be the colour and flavour of the fruit. Give air early, increasing it as the day advances, and close early in the afternoon, at which time the plants, beds, and interior walls should be damped over. When the nights become warmer, a little air may again be put on, which will assist the colouring of the fruit. To insure strong sturdy plants, maintain a uniform bottom-heat of 90° during the season of active growth. The frosty nights which occasionally occur, and cloudy or rainy days, require that this temperature should be kept up by fire-heat.

1263. Withhold water from fruit directly a change of colour is discernible. If the fruit is growing in pots, lift them on the surface of the bed, which will help to improve both colour and flavour. Fires will be required, to allow for extra ventilation, which at this period of the crop's ripening is more than ever necessary. Do not allow the bottom-heat to decline. That portion of the fruiting stock which did not show fruit in February will now be most likely to show. These should be taken care of, as they will bring heavy fruit in October. To assist them, remove the suckers and gills, and keep them regularly supplied with weak manure-water, and frequently damp with the syringe. Plants which have been kept back for autumn supply should now be induced to fruit, backward plants being dry for that purpose, and exposed to the light. When the fruit appears, shift plants requiring more pot-room, and place them where they are to ripen. The most suitable sorts for autumn and winter use are the two varieties of Cayenne, Black Jamaica, and Queens. When ripe fruit is required next April or May, a portion of them should now be selected, and have their final shift. The best early pines are the Old Queen's, Prickly Cayenne, and the Black Antigua.

1264. Succession pines should, at the end of the month, be growing very fast, and require air in liberal quantities, both back and front. Water as they require it, using liquid manure occasionally, clarified, to prevent its choking up the drainage properties of the soil. Maintain a steady bottom-heat, and pot the suckers of the plants from which the fruit is cut. As the stools are removed to make way for other plants, all succession plants requiring repotting should now be shifted. When replunged, leave plenty of room for the foliage to spread out, and place them near the glass, watering with weak manure-water once a week or fortnight, according to their requirements.

1265. *Peach-House.*—The ripe fruit should be looked over each morning, to gather such as are likely to ripen in a day or two. The fruit will be higher in flavour than when allowed to ripen on the tree, and will save them from getting bruised in falling, to which heavy fruit of the peach is very liable, with the best contrivances to catch them. As the crop is gathered, the young wood should be so exposed as to ripen well: on this depends next year's success, in a great measure. Not a single unnecessary shoot should be retained. The tree should be well washed with the syringe, and all foreign matter removed from the leaves.

1266. Give all the air possible to ripe fruit, and shade where it is desirable, to prolong the season. Bring on the second house by an increased temperature; keep damp by the frequent use of the engine, and sprinkle the floors, &c.; at closing-time give the inside border a good soaking with weak manure-water. Keep a moist atmosphere where the fruit is swelling; water freely; give plenty of air, especially in the forenoon.

1267. About the second week turn out cherries in pots into an open quarter of the garden, placing some turfy loam round the balls. This will invigorate them much better than keeping them in pots through the summer. Commence as soon as possible pegging down runners of strawberries for next season's stock of forcing plants.

1268. *Melons.*—As soon as the fruit is cut (if it is intended that they should bear a second crop), prune back the shoots to where the fresh growth commences. Two or three inches of fresh loam should be spread over the surface of the bed, which should at the same time have a good soaking with manure-water, to assist the plants to make a fresh growth; an additional stimulus at the same time should be given to the roots by slightly increasing the bottom-heat. Bring forward the succeeding crops, and take every means to keep down the red spider, which, when once established on the foliage, is most difficult to destroy.

1269. Melons, while ripening their fruit, are very liable to crack when exposed to moisture, or when water is supplied too freely to their roots. This is more likely to happen with the higher-flavoured ones, from the thinness of their skin. In common frames some difficulty will be found in keeping the air sufficiently dry. To prevent this in moist weather, air must be left on at night both back and front, to admit of a slight circulation; and a little extra heat should be thrown into the bed, to keep up the temperature, by turning over linings. Where, however, melons are grown by the assistance of hot water, an atmosphere can be maintained which will fully carry out the ripening process of this delicious fruit, even in unfavourable weather. In watering melons, great caution must be used in supplying only the exact quantity wanted, as an excess of water at the roots only tends to increase the size and deteriorate the quality of the fruit. The kind of structure the plants are grown in will have some effect on the quantity of water they will require. In lofty pits or houses, where the foliage attains a large size, and where a much drier atmosphere is obtained than in frames and low pits, more water will be necessary, and the surface of the soil should be frequently sprinkled.

1270. *Cucumbers* at this season of the year do best with a considerable amount of shade: this should be attended to, and the necessary bottom-heat and moisture kept up. Keep the vines thin and regular by frequent stopping. In planting out at this season, use a rather poor, in preference to a rich soil, which, in cold wet seasons, produces canker.

1271. *Orchard-Houses.*—In hot and dry weather trees will require watering abundantly every evening; in all weathers syringe morning and evening, at seven a.m. and six p.m. If the surface of the soil in the pots or border be dry, a new top-dressing may be added. Thin the fruit, pinching in all shoots to the third leaf.

1272. The red spider will now make its appearance on the tender part of the peach-leaves, and must be extirpated by syringing,—if that fail, by lime or sulphur. The house being closed, take some large flowerpots filled with unslaked lime, and saturated with four or five gallons of water; over this strew a handful of flour of sulphur, and leave it in the house all night. The next morning syringe the house thoroughly. This will destroy the red spider and many other pests of the garden.

1273. Remove plum-trees and apricots into the open air to ripen their fruit. On the 10th, and again on the 25th, lift up the pots in order to break off the roots which have protruded through the drainage-holes, and attend to summer-pinching of pyramid and bush trees.

1274. Ventilation and watering as in last month, syringing till the fruit begins to colour. Pinch the laterals, and at the end pinch off all leading shoots. The ripening of peaches, apricots, and nectarines may be retarded by removing into the open air. Summer-pinch pyramidal peaches.

§ 8.—Hotbed and Frame Cultivation.

1275. Making hotbeds is seldom deferred till this time of the year; yet it may be done advantageously. Both cucumbers and melons, if started this month, will pay for cultivating: the directions for doing so being the same as in former months, it is unnecessary to repeat; but common brick pits will be very suitable for the purpose. Cucumbers in an advanced stage will want clearing of dead leaves, and the soil stirred about them, and probably fresh earth added. A toad kept in a frame will destroy a great many woodlice and other insects, and keep the plants cleaner than they otherwise would be. Having seldom been troubled with pests in the culture of cucumbers or melons, I cannot but consider that their presence is chiefly, if not wholly, the result of mismanagement; but where they do appear, it is advisable to get rid of them as soon as possible. Red spider and mildew are counteracted by sulphur, thrips and aphis by fumigating with tobacco, which is the safest means; but more credit is due to the cultivator who, by judicious care and management, keeps his plants clear of them.

1276. Cucumbers are sometimes allowed to trail over a trellis; by this means the fruit is suspended, and no glass tubes are required to keep them straight: some even when grown on a bed, are tied up with sticks for the same purpose. When tubes are used, it is sometimes necessary to watch them, in order that, during the swelling of the fruit, they are not wedged into the tubes so tightly that they are difficult to withdraw. Care should be taken that the bloom which adorns the fruit is not removed in cutting them. In the application of lining, to maintain the heat, in watering and giving air, &c., proceed as before.

1277. Plants intended for open-air culture, if sown last month, will be ready for ridging out. A south border, or between rows of tall peas, or scarlet runners, ranging north and south, will suit them. Open a trench four or five feet wide, and fill with prepared stable-dung, to the thickness of three feet; cover this with a foot of soil; place the plants five or six feet apart, two or three together, and cover with hand-glasses.

1278. Melons may be started for succession: as these are not generally continuous bearers, nothing is gained by endeavouring to induce old plants to bear again. It is more satisfactory to raise fresh plants and make new beds for them, unless, indeed, they are planted on old beds newly lined. With a tolerable bottom-heat, the growth of these plants is very rapid at this time of the year; and though they may be grown without it, still, for the production of fine fruit, heat is indispensable. Where the fruit is swelling off, the roots will most probably have penetrated the lining: if so, this must not be disturbed, but fresh dung added to it; but care must be taken that the rank heat has passed from the new lining, or the roots will be injured. It is advisable to raise the fruit on tiles or slates, or some such material; boards are not so well, as they are more likely to harbour woodlice under them. Pinch back all useless shoots, but keep the plants regularly furnished with healthy leaves.

1279. Melons, like cucumbers, may be grown on ridges. Some of the Cantalupe varieties do very well this way; but it is advisable to get the plants strong before turning out. Grow them in frames till they are established in 32-pots; then plant them in the same way as directed for cucumbers, making the soil rather firm, and protecting with hand-glasses.

1280. If ridges are prepared in the same way, vegetable-marrows, gourds, &c., may be planted on them, or the seed may be dibbed in at intervals of six or eight feet: they will grow, and be in time to bear in August: they like a light rich soil, and grow very fast after midsummer. The ice-plant, which is sometimes used for garnishing, may be treated in precisely the same manner. Mushroom-beds may be made at this time out of doors: they will come into bearing in August. Horse-droppings, or good short stable-dung, mixed with one-third loamy soil, and well worked together till it gives a gentle heat, I have found best for making the bed: it must not be heaped up too high, or in too great a body, or it is apt to ferment too violently. Some old cultivators, who have no idea of the use of a thermometer, are very successful in the culture of the mushroom, and inform us that the best time to spawn a bed is when it feels of a temperature equal to that of newly-drawn milk. Certainly I believe a proper temperature at the time of spawning is of the first importance; if too cold, the spawn will not work; too great heat destroys it at once: 80° or 85°, I think, ought to be the maximum, and 65° the minimum point. Let the bed be firmly put together in a ridge, or conical or pyramidal form, of sufficient pitch to prevent water getting into it: a trench dug round it will take the rain. The bed must be protected at all times from rain before spawning and before casing, and afterwards covered with about a foot of clean straw, and this, again, with something to keep it together; mats, netting, sticks, or hurdles, will do, although garden-mats are preferable. Beds previously made should be looked over occasionally, and, if dry, watered very gently with water equal at least in temperature to that of the atmosphere.

1281. Many cultivators make use of lawn-mowings for lining hotbeds. Now, although it may be useful in a certain manner, it is far from being a proper material: it heats too violently, and the roots of plants recoil from it; it also has the very disagreeable property of breeding swarms of insects; it is, therefore, advisable to avoid using it about frames; it may be used more advantageously as mulch for kitchen crops, strawberries, or ridge cucumbers or melons: laid on the surface of the ground, and spread out, it is soon dried, and loses its power of doing harm. Capsicums, chillies, egg-plants, &c., should be re-potted into larger pots. This will probably be their final shift. They may then be plunged in a moderate heat, and as they grow taller, the frame can be lifted on bricks or flowerpots, working the linings up to it. Many tender plants may be treated in the same way, and thus prepared for autumn decoration of the conservatory.

1282. Collecting and preparing manure, and transporting it where it is wanted, are operations that should be attended to when other operations become impossible. The waste, not only of liquid, but solid manure, in this country, is enormous. I wish to impress upon all the important fact that everything that has ever been endowed with life, and all the excrements proceeding from them, are available for manure. Their nature, qualities, influence, and the mode of their application, may be endlessly varied; but all alike possess a power of enriching the earth. The hard texture of bone or wood fibre, for instance, may render it desirable to subject them to chemical action, or the influence of fire, to render them more speedily available to the wants of plants; but these hard substances possess the elements of plant-food in common with the soft constituents of plants and animals. The influence of sulphuric acid upon bones is well known; and when fire is used to break down or soften woody fibre, it should be applied so as to char, and not to burn. Charring is effected by covering the heap of wood to be operated upon with turf or earth, so as almost entirely to exclude the air, and thus insure slow combustion. Almost any vegetable refuse, including roots of weeds, can be charred; and this charcoal, saturated with urine, is one of the best fertilizers. It may be usefully drilled in with seeds, in a dry state. The scourings of ditches, scrapings of roads, decayed short grass and weeds, half-rotten leaves, soot, and every bit of solid manure that can be got, should be collected and thoroughly mixed together. The excrements of most animals are too rank and strong for flower-garden purposes, applied in a pure state; by mixing as I have indicated, the bulk of the manure will be quadrupled, it will be sooner available, and muc more valuable.

§ 9.—Window-Gardening.

1283. A beautiful effect may be produced with plants, the beauty of which is in the foliage. Caladiums are almost too tender for window-culture, but several kinds of begonias will not only stand the air of a room, but thrive in it. There are also plants hardier still,—Farfugium grande, for instance, which produces a grand effect: it is closely allied to the Tussilago, or coltsfoot family, and is very easily cultivated. Then, again, there is Cineraria maritima, with its white silvery foliage; also Centaurea zymnocarpa and ragusina, of similar habit; Acacia lapantha, Fuchsia spectabilis, and other plants of ornamental foliage, all of which have peculiar characteristics, many of them admirably adapted to window decoration. I have known a plant of Ficus elastica kept for a dozen years in a window, maintaining a lively foliage and vigorous habit the whole time. This, and similar plants with shiny leaves, have this recommendation, that when the leaves get dusty they are easily cleaned with a dry sponge; or they may be stood outside and syringed; or a shower from the rose of a watering-pot will soon clean them. There are several ferns of a like character; as Asplenium falcatum, A. lucidum,—Scolopendriums or Acrosticums. Ferns afford an endless variety of subjects for window-culture, and the fact of their connection with the origin of the Wardian case gives sufficient evidence of their adaptability for the purpose; but with moderate care they may be cultivated successfully without any such inclosure: the main point is a selection of such as best repay the attention. Many of the British ferns are easily cultivated, but the larger kinds are mostly deciduous, or die down in the winter; and many of the smaller ones are of a delicate nature, although they are often cultivated successfully. The suspended basket is, I believe the best method of displaying them. The following are trailing and suited for the purpose:—Notholæliana tenera, Davallia pentaphylla, Fadiginia prolifera, Adiantum caudatum.

1284. Baskets are sometimes managed in the same way as vases, and even troughs. The plants are grown in ordinary flowerpots, plunged in moss, placed in the baskets, &c., when in perfection. This plan has its advantages; for as a plant gets shabby it can be instantly changed for another. All who possess a frame, pit, or small greenhouse, would do well to adopt this plan; for a plant is not so likely to become one-sided if grown in a frame; the one-sidedness of plants grown in windows being evidence of the advantages to be derived from the possession of other means. But it does not follow that window-plants must be ill-looking because one-sided; nor should their tendency that way be checked by turning them, as they are weakened thereby. Whether inside or outside a window, plants naturally turn towards the light, as every one knows who has had any practice with them. Whatever means are at command, the main points in window, as in all other plant culture, are perfect cleanliness, a free open soil and good drainage, a tolerably even temperature, and uniform moisture. Where there is a tolerably clear atmosphere, window-gardening may be conducted openly, but in the midst of town smoke and dust, glass cases become absolutely necessary.

1285. *Neapolitan Violet.*—This being the season when the Neapolitan violet may be propagated with advantage, a few words on the cultivation of this favourite flower will not be out of place. When the plants have flowered for the season, remove them from the soil in which they have been grown and divide them into single crowns, cutting off all runners and selecting the finest flowers only, and plant them out with the trowel nine inches apart each way, pressing the ground firmly round the roots, selecting for the purpose a rich and well-prepared piece of ground with an east aspect, where they can receive the beams of the morning sun. In such a situation they are said to escape the ravages of the red spider and other pests, and to produce larger and brighter flowers. When the plants show signs of growth, stir the soil about their roots with a small hoe, and syringe them in the evenings of dry hot days with pure water, pinching off all runners as they appear, and keeping the bed free from weeds: nothing more is required for their culture during the summer months.

1286. When the time arrives for forcing them, prepare the material for a hotbed in the manner already described for making a cucumber-bed, either by building it up or by sinking it in the ground two feet, treading down the dung to prevent an over violent heat at first. Over this place the frame, and cover the bed a foot thick with prepared soil, consisting of the remains of an old cucumber-bed with a little leaf-mould added. The plants are then carefully removed, with as large a ball of earth round the roots as possible, and planted in rows close together, but not touching each other, and so arranged that the foliage may be close to the glass without touching it, as it will settle an inch or two after the lights are put on. When planted, give them a copious watering, even to saturation, and in warm showers take the lights off and give them the benefit of it: this will give them a clean healthy appearance. The lights may be kept off all night with advantage when there is no appearance of frost, and all dead, decayed, or turning leaves, should be removed as soon as they appear. Plants thus treated will yield a supply of violets from November to April.

1287. It is immaterial, provided a succession is maintained by separating the crowns as soon as they have done blooming, whether the after-culture is on the bed or in pots plunged in the soil. For pot-culture, the best compost is formed of half-turfy loam that has been turned over two or three times during summer, and half-rotten dung and leaf-mould, well mixed together: this should be ready for use by the end of September. At that time the violet plants must be raised from the bed in which they have been growing during the summer with as much earth to their roots as possible. They should then be divested of all their side-shoots or runners. The proper sized pots are 7-inch ones. One strong plant should be put in each pot; but when they are weak, two or three. The pots should be well drained with broken bones instead of potsherds, for the roots of the violets will lay hold of the bones, which gives vigour to the plants and makes them bloom more profusely. The pots have the advantage of being available for the window, garden, or for removal into the drawing-room or hall, as well as for cut flowers.

1288. Having potted as many as are necessary for the season, a good supply of water should be given to settle the soil well about the roots. A sufficient number of old melon-boxes with the lights belonging to them should be arranged in a southern aspect, placing the boxes in such a manner that the lights will throw off rain quickly, and thereby prevent drip, which in winter not only rots the plants, but causes the flowers to be produced sparingly. The boxes being placed in position, a layer of old tan should be put into them four inches thick: in this the pots should be plunged up to their rims in rows till the boxes are filled. It will be necessary to leave three inches' space between the pots, where the plants are large, that air may be allowed to pass freely between and keep off damp, which is apt to destroy the plant. If they are so small as not to cover the top of the pots, they may be placed close together.

1289. When the temperature is above 50°, the lights may be removed during the day, and at night they should be tilted up at the back for the admission of air. When the temperature is below 50°, the lights should be left on; but even then air should be admitted from behind during the daytime. When the temperature is below 40°, the admission of air should be very partial, if it be admitted at all. At no time after the plants begin to bloom should the lights be entirely removed, except for the purpose of watering or cleaning the plants, or gathering the flowers. When the weather is cold, coverings of mats should be applied at night. In hard frosts, two mats should be put on as well as litter. The earth in the pots must never be allowed to freeze if it is possible to prevent it. The coverings must be removed in fine days. In March and April, as much air as possible should be given if the weather is fine.

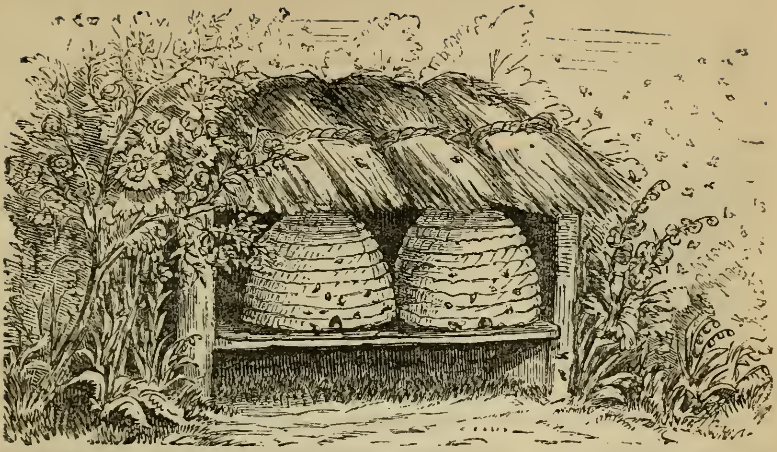
1290. The pots should be examined at all times when the weather will permit. Weeds and decayed leaves must be removed, and a little water given when the soil is dry. Care must be taken to wet the leaves as little as possible. In March and April, if the plants have been properly managed, they will produce abundance of flowers, and consequently will require more moisture than during winter.

1291. Where it is desired to have violets in summer and autumn, runners should be laid either in pots or on a hotbed where they are growing, in February, selecting the strongest runners, and pegging them down, with a little soil over the runner, and keeping them moist: these will be ready to plant out early in April, each with its bundle of roots, and will come in a month or six weeks earlier than the others. But they must be placed in their winter quarters early in September.

§ 10.—COTTAGE GARDENS AND ALLOTMENTS.

1292. Like gardens of greater pretensions, these require at this time of the year considerable attention. Where early crops have been growing, and are no longer serviceable, they should be removed without loss of time; the ground dug or trenched, or forked over, preparatory to getting in crops for the winter and spring following. The directions given elsewhere apply, in all cases, as regards the treatment of different crops. The main object is to point out such crops as would be most profitable in a small way. One of the cheapest means of cropping at this time is to sow the ground with turnip-seed: a quarter of a pound of seed (about 9*d*). would sow half a dozen rods. If sown on newly-dug ground, it would be up in three days, and would yield many dishes of a wholesome vegetable in winter; leaving many plants to yield useful greens in March and April following. Other useful vegetables are borecole and Brussels sprouts: of the former, the green-curled is much esteemed. There are others of equal merit; all are very hardy and prolific, and furnish sprouts for the table from November to May. If they have not already been planted, it should be done as early as possible this month. Winter spinach is also useful, and, as the seed is cheap, it may be advantageously grown by the cottager. Coleworts, again, are very profitable: they may be planted thickly, and give a good supply of greens for several months in succession. Where potatoes have been planted to any extent, such crops may be planted between the rows before the potatoes are lifted, so that no time is lost. If the plants are shaded until they are established, it will be no disadvantage; they will be ready to start when the previous crops are removed: the ground can then be forked between.

1293. It is impossible to over-estimate the advantages to be derived by working men from a small garden-plot; it is a subject worth a little consideration from employers. An instance I could cite, of a most orderly and well-behaved set of men, who seemed contented with their lot, and were most respectful towards their employer, who derived their chief pleasure from a small garden-plot allotted to each, for the purpose of profitably employing the leisure hour.



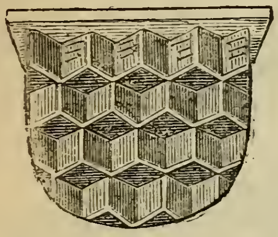
CHAPTER XXV.

BEE-KEEPING.

1294. THIS is an important branch of rural economy in all countries, and there are, probably, few gardens in which the beehive does not find a place; but certainly, with us, it has never attained the importance to which it is entitled. In this country, where highly-cultivated plains, valleys, and woodlands so abound, with ranges of hills of moderate elevation, there is no end to the extent to which bee-keeping might be carried; but how few and far between are the apiaries worthy of remark;—a few miserable straw hives covered with turf, or shut up in miserable wooden hovels in the winter season, are the abodes of the industrious and highly-civilized bee. If we could only impress upon our rural population how highly-productive bee-keeping is to the rural population of foreign countries, and rouse them to similar exertions, a great national advantage would be gained.

1295. The hive-bee (*Apis mellifica*) may be regarded as one of the most perfectly social species of insects, and one whose economy is regulated by the possession of a more perfect degree of instinct than is possessed by any other of the insect tribes. Another peculiarity, necessarily depending on the social habits of these insects, is the existence of individuals which have been regarded by many as a third sex, but which modern investigations have ascertained to be female insects, whose internal and sexual organization is in an undeveloped state. These individuals, neuters or mules, or workers, or female non-breeders as they have been termed, constitute the great mass of the population of the hive; they are the smallest members of the community, and it is to them that the internal economy of the hive is committed, the whole labour of the community devolving upon them. Moreover, it is their duty to guard and protect the queen and the hive, to feed the young, and to kill the drones at the appointed season. In a single hive there are sometimes as many as 30,000 of these individuals. They are distinguished from the fully-developed female by having a larger hip, the jaws not notched at the tip, and the sting straight.

1296. The apparatus for collecting and carrying the pollen consists of a hollow in the hind legs of the working bee, of which a magnified side-view is given in A, fig. IV., and the interior fig. B, the inside of the last joint of which has a brush-like apparatus for collecting and holding the pollen as collected.



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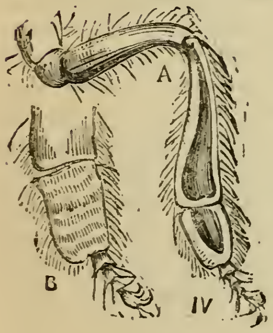


IV

1297. The arrangements of cells, as represented in fig. III., are remarkable instances of skilful workmanship and adaptation, being in the very form which the mathematician would select for holding the largest number of inclosures in a given space.

1298. The perfect female, of which there is but a single individual in the hive, is termed the queen, and is distinguished by her greater size, more elongated form, brighter colour, shorter tongue, notched jaws, and curved sting. Her duty principally consists in the laying of eggs; and in her proceedings she is attended by a body-guard of workers, who pay her the greatest attention: hence she is the mother of the hive. It is one of the most curious points in the history of this insect, to notice the immense influence which this solitary female has upon the entire population of many thousand bees. The absence of the queen deprives the workers of no organ, paralyzes no limb, yet, in every instance where they are deprived of her, they neglect their duties, and, unless provided with another queen, they refuse food, and quickly perish.

1299. The male bees, of which there are several hundreds, sometimes two thousand, in a hive, are idle creatures, doing no work. Their only duty is to impregnate the female; and this effected, they are driven from the hive and killed by the workers, who thereupon destroy the male larvæ and pupæ remaining. They are called drones, a term which has been also applied to various species of flies which much resemble bees, but which may at once be distinguished by having only one pair of wings.

1300. The true drones are more bulky, and they are not armed with a sting. Their antennæ are composed of thirteen joints (those of the females and workers having only twelve articulations), the head is more rounded, the eyes larger and meeting behind; their jaws are smaller and very hairy; and the basal joint of the posterior tarsi has neither pollen-plate nor brush. They make a much greater noise in their flight than the others, and at the extremity of their body, two small corneous appendages are to be observed, of a yellow colour, which, with some other internal organs, constitute their several apparatus.

1301. In addition to these three kinds of individuals, it is to be observed that there appear to be two sorts of females,—the large and the small. Reaumur, however, attributes this difference of size to the state of the eggs in the body. There are likewise two descriptions of males,—one not larger than the workers, and supposed to be produced from a male egg laid in a worker's cell, and the other as above described. Moreover there are, according to M. Huber, two sorts of workers; the first, which he calls *cirières*, wax-makers, being charged with the collecting of food and secretion of materials for building the nest; and the second, which he calls *nourrices*, or nurses, smaller, and more weakly, whose cares seem to be directed to feeding the young, and to the domestic concerns of the nest. Much difference of opinion has prevailed as to the origin of wax, it having been supposed by many that the yellow matter was the farina of flowers, collected upon the thighs of the bee. More recent investigation shows pretty clearly that wax is produced from honey, which has been repeatedly secreted when the bees have been confined where they could not obtain the farina. The wax is secreted by a singular series of organs between the abdominal scales, and Mr. John Hunter detected the wax reservoir under the bee's belly, and in connection with the organs.

1302. Huber also notices another kind of bee, which he terms black bees, and which appear to be only casual inmates of the hive, from which they are always expelled, and often killed by the workers, with which, however, except in having the head and thorax of a darker colour, they agree both in their external appearance and internal structure, having, like the workers, perfect ovaries; although not furnished with eggs, these black bees, Kirby and Spence think, may be superannuated bees, past work, who are maintained by the charity of the community.

1303. Honey is obtained by the bees from the nectaries of flowers, which are constantly secreting a sweet nectarial fluid. This is sucked up by the tongue of the insect, a portion of it is consumed at once for its support; but the majority of the supply, although taken into the stomach of the bee, is again regurgitated, and poured into the cells of the hive for the food of the grubs and the use of the community during winter. These cells are placed in the most inaccessible part of the hive, and are closed with waxen lids; but the honey destined for the use of the nurses, workers, and drones, is deposited in unclosed cells. The quality and taste of honey depend upon the plants frequented by the bees; the finest-flavoured and most delicate honey is collected from aromatic plants, and has been stored in clean and new cells; for which reason, and not because it is elaborated by a fresh swarm of bees, it is termed virgin honey. Hence it is advisable to have large patches of such plants as borage, vipers' bugloss, mignonette, lemon, thyme, and sage, in the neighbourhood of the bees' hive. Lime-trees, furze, heath, and clover, are also desirable.

1304. Honey, however, occasionally has been found to have acted like poison, a circumstance, probably, owing to the bees having extracted it from poisonous plants. Dr. Hosack has recorded two cases in which this substance produced violent vomiting, a coldness at the extremities, and a livid appearance of the countenance. The pulse was reduced to about twenty in a minute; the spontaneous vomiting, however, being followed by a dose of castor-oil, together with the application of fomentations, relieved the sufferers. In these cases the honey was of a dark reddish colour, and a thicker consistence than usually sold in the market.

1305. Various plans have been adopted to obtain the honey from bee-hives without resorting to the cruel, unnecessary, and now nearly exploded, practice of sacrificing the lives of the bees by placing the hive over a hole in which lighted brimstone is placed, the fumes from which in a short time kill the bees.

1306. The plans chiefly adopted have had for their object the expulsion of the bees from the old nest after the combs are well filled with honey, into adjacent boxes, in which they then commence their labour, or, after the removal of the honey, they are again returned to their old habitation. The following is a plan adopted by Mr. Nutt, by which means a secretion of a much larger quantity of honey is caused than can be produced in the old plan. Three collateral boxes are placed side by side, with a single entrance in the centre, one which, however, communicates with the side-boxes by apertures which are easily closed by a tin slide. The bees are first introduced into the centre box; when this is filled with honey, which is allowed to remain for the use of the bees, in order to obviate the necessity of swarming, Mr. Nutt removes one of the slides and establishes a communication with one of the side-boxes, the temperature of the latter being regulated by a perforated tin tube, which acts as a ventilator, and by which means these additional store-boxes are kept at a proper working temperature and *below the generative heat;* in consequence of which the queen bee is always retained in the middle box. The heat of the side-boxes is kept at 70° or 80°, whilst the natural temperature of the working hive is 90° or 100°, increasing even to 120°. When the temperature of the side-box rises towards the latter point, it is evident that they are full, and the necessity which exists for establishing a connection with the centre and the other side-box is thus shown. The bees are easily driven from the full side of the box by the action of the ventilator, when the communicating aperture is closed by means of the slide, and the first full side-box is then removed, and the bees finding the middle box full, soon find their way into the other side-box. The ingenious action of the ventilator is designed to retain the queen in the middle box, since the reduced temperature of the side-boxes prevents the queen from rendering them her domicile. By this means a great superiority both in the quantity and quality of the honey is obtained, as it contains none of the eggs, larvæ, pupæ, pollen, or bee-bread, which are found in the centre box in considerable quantities for the support of the young.

1307. It is a remarkable circumstance, that in a new colony the design of every comb is sketched out and the first rudiments laid by a single bee, which, having disengaged itself from the swarm, commences the building of cells, which is then taken up by the other wax-makers, and subsequently by the nurse bees, which give the finishing stroke to the cells. Fig. II. represents the operation of laying the foundation of the cell, and fig. I. a curtain of working bees secreting the wax. The combs are attached to the roof and sides of the dwelling, the hives or boxes to the floors and roofs, and the cell-work of the combs varnished with a resinous, very tenacious, and transparent substance, termed propolis, which the bees collect from various trees,—as from pines and other trees of the fir tribe according to some authors, but from the wild poplar according to Huber.

I

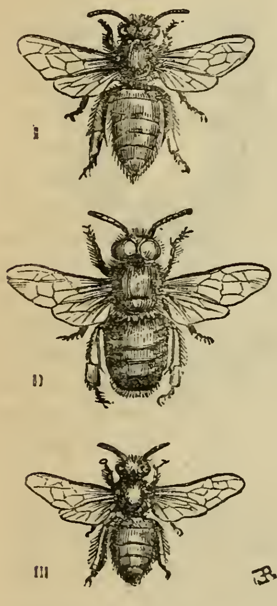
II

1308. There are three sorts of cells,—the first are for the larvæ of workers, and for containing the honey; the second are for the grubs of the males or drones (being considerably larger and more substantial, they usually appear near the bottom of the combs); the third are the cells for the females, of which there are usually three or four. One of these cells considerably exceeds in height the ordinary ones, and they are not interwoven with them, but suspended perpendicularly, their sizes being nearly parallel to the mouths of the common cells, several of which are sacrificed to support them: they are of an oblong, spheroidal form, tapering gradually downwards.

1309. After the queen-bee has quitted her cell, it is destroyed by the workers, and its place occupied by a range of common cells. The queen deposits her eggs separately in the bottom of each cell. The egg is of a lengthened oval shape, with a slight curve, and of a bluish colour. When laid it is covered with a glutinous matter, which enables it to adhere to the bottom of the cell, where it remains for four days. The worker eggs, which are the only ones laid by the queen during the first eleven months, hatch in a few days, and become little white maggots, which, as they grow, assume a curved position till the two extremities touch each other and form a ring. Each is now fed with bee-bread by the workers, and at the expiration of six days, having attained its full size, it is roofed in by the workers, spins a silken cocoon, which occupies it for thirty-six hours, and then becomes a nymph or pupa, and at the further expiration of eleven days, the insect quits the exuviæ of the pupa, eats through the roof of the cell, and comes forth a perfect worker bee.

1310. The male bee passes three days in the egg state, six and a half in the larva, and makes its appearance at the further expiration of fifteen days.

1311. The development of the queen-bee requires a more lengthened notice, involving some of the most interesting points in the economy of the hive. We have said that for nearly twelve months the queen-bee deposits only worker eggs, after which period, however, she commences laying those of drones. As soon as this change takes place, the workers begin to construct royal cells, in which, without discontinuing to lay male eggs, she deposits now and then, about every three days, an egg destined to produce a future queen. This laying of eggs commonly happens in May, lasts thirty days, and regularly on the twentieth or twenty-first day royal cells are founded. The queens pass three days in the egg state and five in the larva; they are then occupied twenty-four hours forming their cocoons, their cell having been previously closed by the workers. During nearly the whole of the three following days they repose in their cocoons, after which they are transformed to pupæ, in which state they remain between four and five days, appearing in the perfect state on the sixteenth day after the eggs are deposited.



I. *The Queen Bee.*
II. *The Drone, or Male Bee.*
III. *The Worker, or undeveloped female.*

1312. The food of the royal grubs has been termed royal jelly. It is a pungent food prepared by the workers exclusively for the purpose of feeding such of the grubs as are destined for queens, and is more stimulating than the food given to the common grubs.

1313. Should it happen, as sometimes is the case, that the queen is killed, or the hive in any manner deprived of her during the first eleven months of her existence, and before she has deposited any royal eggs, the most extraordinary circumstances occur. For twelve hours little notice is taken of the loss. Presently a hubbub commences, work is abandoned, the whole hive is in an uproar, every bee traverses the hive at random with the most evident want of purpose. This state of confusion sometimes continues for several days, then the bees gather in knots,—clusters of a dozen or so, as though engaged in consultation; shortly after which a resolution appears to have been taken by the whole population. Some of the workers select one of the worker eggs which have been previously deposited by the lost sovereign. Three cells are thrown into one for its reception, the eggs of the two other cells being destroyed. The grub when hatched is fed with royal jelly, and a queen is produced. Even if the grub had been hatched and partly fed as a worker, and had only received two or three days' allowance of royal food, the result would have been the same. They emerge from the pupæ perfect queens, whereas, had they remained in the cells which they originally occupied, they would have turned out workers, having their form, instinct, and organs of generation entirely different.

1314. We are now to suppose that the period of the year has arrived that the queen insects, having undergone the change to the pupa state, are nearly ready to burst forth into life. It is now that the old queen-mother, losing all her parental feelings, becomes infuriated. She rushes to the cells wherein are deposited the future queens, and instantly begins to tear them open. The guard which surround the cells make way for her approach, suffering her to act as she pleases; whereupon she slaughters the inmates with her stings without remorse. As the cells, however, are thicker than those of the workers, she is soon fatigued by her labours, and after she has opened one or two, she languidly attempts to gnaw through a third. The sight of these cells agitates her to such a degree that she runs about the hive in a state of delirium. This excitement she soon communicates to the workers by touching their antennæ, and after rushing about in all directions, a large portion of them, accompanied by their old queen, rush out of the hive and seek a new house. In every instance it is the old queen which leads the first swarm. Experience enables the apiarist to foretell this event; for on the evening previous to swarming the bees suddenly leave off their work, as if aware of the approaching change, while a few scouts are sent out in search of a new colony. Something very like concerted action and foresight is evident in these proceedings. It is always in calm weather, when the sky is serene, between nine in the morning and four in the afternoon, that they quit their habitation. If the queen is not amongst the first which issue forth, she is not long in repairing after them, and in less than a minute she is followed by all the bees which are to compose the swarm. By degrees they fix themselves upon a branch, form a group there by hooking themselves one to another with their feet. Although they are exposed, they remain quiet, and often, in less than a quarter of an hour, we see scarcely more bees hovering round the swarm than are to be observed round a hive in fine weather. If, in sallying forth, they fly towards some large tree, there is reason to fear that they may wander beyond the limits of the hive. They are easily brought down by throwing up handfuls of dust.

1315. Although the swarm remain tranquil, it must not be left long in this position without offering it a lodging, especially if the sun be warm. Thus, therefore, in the swarming season, it is necessary to have hives quite ready. The interior of a hive should be perfectly clean before it is presented to the bees, for they are fond of cleanliness. To render it agreeable to them, the sides should be rubbed with flowers of melissa, bean-flowers, &c., of the scent of which they are fond. Some parts of it should also be moistened with a slight layer of honey. The bees that remain in the old hive take particular care of the royal cells, and prevent the young queens successively hatched from leaving them, except at an interval of several days from each departure. As soon as a young queen is hatched, she proceeds to attack the other royal cells; but here there is a remarkable difference in the conduct of the workers. The moment she attempts to approach a royal cell, the guards surrounding it immediately drive her off. Irritated at this, the young queen stands upright, and utters a shrill and clear sound. No sooner is it heard than the bees appear to be paralyzed: they remain motionless, and hang down their heads. She then attacks the cells, but, in doing so, ceases to pipe; when the bees, recovering from their stupor, drive her away again. This is continued till the queen is irritated to such a degree that she follows the steps of her predecessor, and, in a state of delirium which is communicated to a portion of the workers, she quits the hive with a second swarm. In this manner several swarms take place in the course of the summer between the months of April and August, a necessary consequence of the great increase in the population of the hive.

1316. After the royal cells are closed in, in order that the inclosed grub may undergo its change to the chrysalis state, the workers immediately remove here and there a portion of the wax from the surface, so as to render it unequal; and immediately before the last metamorphosis takes place, the walls are so thin that all the motions of the inclosed pupa are distinctly visible. On the seventh day, the part covering the head and trunk of the pupa is almost entirely unwaxed, whereby the inclosed insect, on arriving at its winged state, would be able to make its exit, were it not for the proceedings of the workers. As soon as the workers perceive that the young queen has cut through her cocoon, they immediately solder the cleft up with wax, and so keep her a prisoner against her will. Upon this, as if to complain of such treatment, she emits a distinct humming sound, which excites no dread or pity in her subjects, who detain her two days longer. During this period she sometimes thrusts her tongue through the cleft she has made, drawing it in and out, until she is noticed by the workers, who thereupon feed her with honey, till, her hunger being satisfied, she draws her tongue back. At the proper period she is released, and proceeds as her predecessors had done.

1317. Shortly after the swarming, the impregnation of the queen takes place. The queen, being preceded by the drones, and having previously reconnoitred the exterior of the hive, rises aloft in the air, wheeling upwards in large circles until she is out of sight. She returns in about half an hour, with the most evident marks of impregnation, although occasionally these excursions are of shorter duration, and are repeated, the female, in such case, exhibiting no such marks. Now it is that a new stimulus to exertion is given to the workers; everything is done with the greatest care, and they appear o be fully conscious of the importance of their activity. The progress of their abours is the signal by which the queen is directed in laying her eggs.

1318. But it is not the queen alone which deposits eggs; it has been well ascertained that the worker-bee occasionally lays them; but it is remarkable that these workers never deposit anything but male eggs. It has been supposed, however, that there must have been small queens mixed with the workers, whose office it was to lay male eggs in old hives. As, however, this is so contrary to the known proceedings of the real queen, it is more probable that these fertile insects, which are smaller and more slender than the common workers, may be common workers which have derived their fertility from the circumstance of some royal jelly having been casually dropt into their cells when grubs, as they uniformly issue from cells adjoining those inhabited by grubs which have been raised from the plebeian to the royal rank. Such, at least, is the commonly accepted opinion of authors; but it is evident that further observation is required here; for the change of functions arising from change of food, is contrary to all known physiological principle, and may be pronounced as the merely apparent result of a phenomenon whose real cause is still a mystery.

1319. The duration of life in the different individuals of the hive is various. The male bee's existence is not more than two or three months. The female has been known to live for five years, although the general term of her existence is from two or three years, and the workers do not appear to be so long-lived as the queen; probably little longer than a year being their term of life.

1320. There are two prominent systems in use in the management of bees, each based upon the importance of giving room, and diminishing their disposition to swarm. One of these systems is placing the hives or boxes side by side (Nutt's collateral system), the other advocates the piling of the boxes one upon another (the storifying system), affording, in both cases, a free communication whenever required. Whichever of these modes be had recourse to, the bees have a regular habit of constructing their combs at uniform distances, from each other; but they have also another habit when they are untutored—viz., that of building them irregularly, insomuch that their position is frequently curvilinear, and sometimes they are even placed at right angles with each other. This proceeding forms a great impediment to the manipulation of wax and honey. To avoid this, every box or hive should be furnished with movable bars, upon each of which, or at any rate upon every other bar, pieces of worker-comb should be fixed to serve as a guide to the bees, prior to the introduction of a swarm; and it will be found that the bees, if they have their guide-combs correctly and securely fixed, will invariably accept them as the foundation of their future structures, by which means several important objects will be accomplished. In the first place, the facility for taking the stored honey will be very much increased. In the next place, if the bees are not wealthy enough to spare a whole boxful of honey, you can, without difficulty, take from them what they can spare. And, thirdly, if in your apiary there should be any families very unequal in wealth, provided the boxes and bars are reciprocally adapted to each other, one or more bars can be removed from a weak hive, and exchanged for the same number of loaded bars from a stronger one; thus giving needful support to one or more families, without injury to any. In the performance of these operations the use of a little tobacco-smoke is requisite to paralyze the bees so far as to prevent them from being intrusive. If the object be to collect pure honey, and to prevent swarming; as soon as you have ascertained that the box is about three parts full of combs, another box should be placed either under or over the first, and a communication opened between them. In some remarkable seasons even a third box may be required; but this will rarely happen during the first year of a family's establishment. During the first year honey should generally be rather sparingly taken. In future years, in good seasons, from thirty to forty pounds may be taken from each family; in highly favourable seasons, in a good locality, much more.

1321. The Ligurian, or yellow Alp-bee, recently introduced into this country through the agency of Messrs. Neighbour & Sons, is rapidly replacing the old *Apis mellifica.*

1322. The yellow Italian Alp-bee is a mountain insect, found between two mountain-chains to the right and left of Lombardy and in the Rhætian Alps. It thrives up to the height of 4,500 feet above the level of the sea, and appears to prefer the northern clime to the warmer side of the Alps.

1323. It differs from the common black bee in its longer, slender form, and light chrome-yellow colour, with light brimstone-coloured wings, and two orange-red girths, each one-sixth of an inch wide. Working bees as well as drones have this mark. The drones are further distinguished by the girths being scolloped, and attain an astonishing size, almost half as corpulent again as the black drones. The queen has the same marks as the working bees, but much more conspicuous and lighter; she is much larger than the black queen, and easy to be singled out of the swarm, on account of her remarkable bodily size and light colour, being in shape and colour not unlike a wasp. They are almost transparent when the sun shines on them, and have nothing in common with the black bees: this can be instantly seen by their ways and manner of building. The cells of the Italian bees are considerably deeper and broader than those of the black bees; fifteen cells of the Italians being as broad as sixteen cells of the black kind. They are extremely tender, amiable little creatures, and a bee-protector is not necessary with them, as, unprovoked, they never sting. The Alps are their home, and there they thrive beautifully; the higher the better.

1324. A healthy hive of yellow Alp-bees (*Apis helvetica*) contains three kinds of bees:—1. the queen, or mother-bee; 2. the drones, or males; 3. the working bees, or imperfect females.

1325. The queen lays in summer daily from 1,000 to 3,000 eggs, and these in the best order; one egg in a cell. More than one queen the bees do not suffer. Should there be more, like the black bee, they fly away as swarms, or are killed by the bees.

1326. The queen lays male eggs in the drone cells, and female eggs in the small cells of the working bees.

1327. Of the working bees there are in a hive from 6,000 to 70,000.

1328. The queen requires from the egg ten to seventeen days to her full development, when she will fly out about from one to three days, after her creeping out of the egg, to be impregnated; and then, after the lapse of six or ten days more, she commences to lay eggs. Then she will not fly out again unless with a swarm. The queen is only once impregnated during the whole course of her life, which lasts from about three to five years.

1329. The drones or males in a hive are about 2,000, and then only in summer; for, as soon as the swarming and honey-carrying time is over, they are turned out as useless eaters. They serve only to impregnate the queen. The drones require from the egg to maturity twenty-one to twenty-four days.

1330. The working bees, according to Hermann, probably mate with the drones, and are, therefore, capable of laying eggs, which produce only drones; a hive in which the working bees lay eggs is going to destruction. It can soon be observed, as they lay often two, three, to twenty eggs, without order, in one cell. In such a hive there is no longer a queen, and it is best to separate it at once or to unite it with a healthy hive, for such demoralized people generally kill their new queen. Those who dispute the mating of the working bees with the drones are in error. Only place young bees without a queen in a place distant from any drones, and no eggs are ever discovered; but, as soon as they are brought in the neighbourhood of drones, and they have no queens, they lay drone eggs.

1331. The first thing for consideration in forming an apiary is situation, especially the aspect. An apiary would not be well situated near a great river, unless well sheltered; neither is proximity to the sea-shore desirable. In windy weather, the homeward-bound bees would be blown to sea and be drowned; for, in spite of Virgil's assertion that—

> "They, with light pebbles, like a balanced boat,
> Poised through the air, on even pinions float,"

the hive-bee has no such contrivance for ballasting her tiny form when on the wing. For these reasons an apiary would be badly placed either on the sea-shore, or near an exposed and broad river; yet it should be near to some brook or rivulet gliding over its pebbly bed, so shallow as to permit of their resting on the stones to sip the passing element. The directions given by Virgil, although not free from error, are very practical:—

> "First for thy bees a quiet station find,
> And lodge them under covert of the wind,
> For winds, when homeward they return, will drive
> The loaded carriers from their evening hive;
> Far too from cows and goats, insulting crew,
> That trample down the flowers, and brush the dew;
> But near a living stream their mansion place,
> Edged round with moss and tufts of matted grass;
> Wild thyme and sav'ry set around their cell,
> Sweet to the taste and fragrant to the smell;
> Set rows of rosemary, with flowering stem,
> And let the purple violets drink the stream."
> *Georgics*, Book iv.

1332. The aspect should be more or less southerly, and sheltered from the more boisterous winds. But Milton, a very excellent authority, says:—"It is not material in what aspect the stocks stand, provided the sun shines upon the hive once in the course of the day, as well-peopled hives, kept dry, will thrive in most situations." "At any rate," says Bevan, "no walls, trees, or houses, should lie in the right line of their hives, to impede the bees in going to or returning from their pasturing. They should be able to fly off their resting-boards at an angle of 40° with the plane of the horizon, and return to them on a bee-line."

1333. It should be near the dwelling, for the purpose of familiarizing the bees with the family, and the feeding-ground should be at hand; for, although bees will travel long distances for their food, the nearer it is at hand the more abundant will be the fruits; the best pasturage is clover, sainfoin, buckwheat, and the flowers of most garden plants,—the common crocuses, blue hepaticas, Christmas roses, wild thyme, mignonette, resedas, Salvia nemorosa, honeysuckle, lavender, ivy, and almost all the summer flowers, are most nutritious for bees. All the willows, the lime-tree, and the horse-chestnut, and most of our forest trees, are equally so; but nothing delights them so much as the furze-blossoms of our commons and the wild heaths of our hills. An outdoor apiary should admit of being approached by a back entrance, in order to observe the bees, and perform any required operation on the hives.

1334. These should be placed each on a separate stand, three feet apart, and clear from wall or fence, where they occupy the open ground. The resting-boards should have a gentle slope outwards to prevent moisture from getting under the hive. Above all, wherever located, let neatness prevail; keep away spiders and other insect intruders; suffer no weeds to grow in its vicinity, which may entangle the weary bee on its return, or shelter its insect enemies.

1335. If no water is near the hive, some must be supplied, as the bees require it to moisten the pollen with which they feed the brood. Destroy all queen-wasps, for they are amongst the worst enemies of bees. Keep everything about the hive trim and clean, rout up ants' nests, brush away spiders, and kill all moths, slugs, and other vermin. Attention must be paid to see that the bees have sufficient food: many hives that have lived through the winter perish from want of attention to this point. If the bees in one hive be idle, whilst those in others are all busy, feeding should be at once attended to; idleness and hanging about the entrance are frequently attributable to weakness, from scarcity of food. Stock-hives may be bought as late as the end of March, provided they be moved from a distance of three or four miles. This is, perhaps, the safest time to buy stocks, as all fear of their perishing is then at an end. Care should be taken in buying stocks to select prime swarms of the last summer; they may be known by the combs being lighter in colour than older stocks. Before introducing a swarm into a hive, singe off all rough shaws, as they hinder the bees in their work.

1336. Hives four years old and upwards should be allowed to swarm. Keep the centre holes in these hives covered up. In hives less than four years old it is desirable to prevent swarming. Keep such hives shaded from the sun, and give the bees in them more room by putting on small hives and boxes. A piece of perforated zinc laid over the hole in the centre, by allowing a current of air to pass through the hive, greatly assists in keeping it cool. The zinc must be removed and cleaned, as the bees stop up the holes in it.

1337. The most favourable period for swarming, is from the middle of May to the middle of June; the usual time being from ten till three o'clock, although it is sometimes earlier and later. The indications of the approaching event are a general restlessness and commotion, and the expulsion of drones from the hive, accompanied by the idleness or "miking," if we may use a term sometimes applied to the inhabitants of the human hive of working bees in like circumstances. Clustering, or hanging suspended round the entrance-holes, is considered an infallible symptom of the intention, although it is only so when taken in connection with other symptoms. If—

> "the impassion'd throng
> Pace o'er the hive, and seem with plaintive song,
> To invite their loitering queen,
> Or hang in cluster'd columns from the door;
> If even the drone his wonted ease gives o'er."

These are the precursors of a first swarm; still more imminent is the event, if the bees which return laden with pollen from the fields remain with the cluster. But unless the hive contains a young princess to reign over her former kingdom, the queen will not be induced to depart with them, and the clustering may last till August in hot, dry seasons. In the after-swarm a singular piping noise, which has been very accurately described by Aristotle, and which lasts several nights, precedes swarming. This piping is said to proceed from the imprisoned princesses, who are on their promotion. Out of this and other well-known symptoms, the apiarian will be able to judge when the swarm may be expected. The more immediate symptoms are bees sporting in large numbers in the air, in front of the hive. Immediately before, a lively agitation prevails, which pervades the whole family. In this agitation the queen has been supposed to participate; but this is not always the case. When joining in the flight, she seems to be borne along by the torrent which streams out of the hive; and, after having diffused themselves for a short time through the surrounding air, some of them settle on a bank or tree, where they are joined by all the rest, and, putting themselves together, they assume the form of a cone or cluster of grapes. If, after issuing from the hive, the swarm either hover in the air as if uncertain what to do, or quit the hive where they have been placed, or leave the branch on which they first congregate, and fly off with a whizzing sound in a direct line, they are bound to a spot already selected by the sages of the hive:—

> "For when thou seest a swarmy cloud arise,
> That sweeps aloft and darkens all the skies,

> The motions of their hasty flight attend:
> To woods or floods their airy march they bend.
> Then milfoil beat, and honeysuckle pound,
> With these alluring savours strew the ground,
> And mix with tinkling brass the cymbal's droning sound.

Such are the remedies recommended by Virgil for the recovery of a lost swarm.

1338. The hiving of a swarm is, of course, a very important operation to the bee-keeper. The descendants of some of the original bees of the hive are said to select an hereditary branch on which to swarm, where they patiently wait for the new home which is being provided for them: this is, probably, a doubtful statement. The hives provided should be new, perfectly clean, and if of straw, carefully singed and made smooth; if an old hive is used, whatever its material, it should previously be dipped in boiling water and thoroughly cleaned. The old Virgilian notion prevails to a large extent, that the tinkling noise of cymbals, or clattering on the more homely frying-pan, would bring them to their hive. All scientific bee-keepers discountenance this notion, and the celebrated White of Selborne has asserted, with strong appearances of probability, that bees have no sense of hearing. When disposed to stray, handfuls of fine sand, thrown among them, are said to bring them to descend and cluster. Bees are generally peaceable when swarming, especially where no alarm is exhibited. We have seen a lady, not particularly experienced in the matter, take a swarm without any preparation as to dress, simply by remaining perfectly quiet, and exhibiting no alarm, and apparently feeling none.

1339. Mr. Lombard relates the following circumstance:—"A young girl of my acquaintance was greatly afraid of bees, but was completely cured of her fear by the following incident:—A swarm having come off, I observed the queen alight by herself at a little distance from the apiary. I immediately called my little friend, that I might show her the queen; she wished to see her more nearly, so, after having caused her to put on her gloves, I gave the queen into her hand. We were, in an instant, surrounded by the whole bees of the swarm. In this emergency I encouraged the girl to be steady, bidding her to be silent and fear nothing, and remaining myself close by her. I then made her stretch out her right hand which held the queen, and covered her head and shoulders with a very thin handkerchief. The swarm soon fixed on her hand, and hung from it as from the branch of a tree. The little girl was delighted above measure at the novel sight, and so entirely freed from all fear that she bade me uncover her face. The spectators were charmed with the interesting spectacle. At length I brought a hive, and, shaking the swarm from the child's hand, it was lodged in safety, and without inflicting a single wound."

1340. It is not always possible to prevent swarming, neither is it possible to ascertain with certainty when the first swarm will rise; the hives must, therefore, be watched from ten o'clock till four, from the middle of March to the end of June. Swarms must be hived as soon as they settle. The hive should be set on a pedestal next to the parent hive; if allowed to continue where they alight, even till night, many bees will return thither next day, and be lost.

1341. Second swarms will most likely come off between the ninth and fourteenth day from the rising of the first. If second swarms rise before the end of March, or even the beginning of April, and are large, they may be set up; if not large, they, as also third swarms (which do not often come off), should be returned to the parent hive, or joined to some other second swarm that has been set up, or to some weak stock. Should the weather be bad directly after swarming, feed them a little, otherwise the bees will most likely perish. Any sweet syrup given in a saucer, with some bits of wood floating in it, will do for feeding them at this season. Do not fix down the hives with clay or mortar,—the bees will do this themselves far better than it can be done for them, with the propolis or gummy substance which they collect from the horse-chestnut and other trees; but fix it firmly to the board, to prevent it from being blown down in windy weather. Keep all plants round about the entrance below the level of the floor-boards.

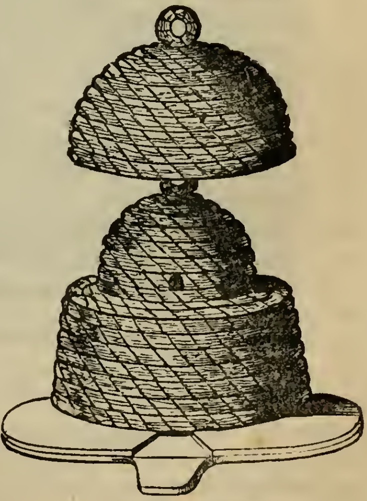
1342. When the hives are about three-quarters full, more room should be given, or a swarm may rise from the stock; if quite full, the honey should be taken away. A hive is full when all the cells are ceiled over. Where there are small glass windows, it can easily be seen if they are full or not; where there are none, discretion must be exercised. As a rule, when the bees begin to cluster at the mouth of the hives, extra room should be given, and about a fortnight after this (if the weather has been fine) the full hives may pretty safely be removed.

1343. In hot weather attention must be paid to the shading and ventilating of the hives, and watching for and destroying vermin. Fresh hives should not be given till the second week in July, or the bees will want a great deal of feeding in October. This applies to garden counties, and in heather counties the season both begins and ends much later.

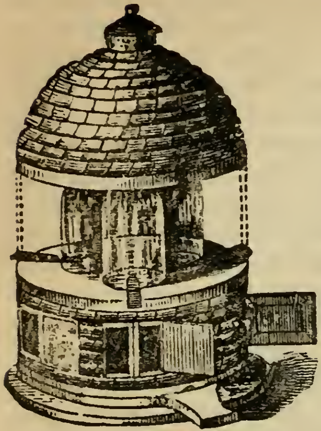
1344. As hives are removed, a piece of wood or straw, or, if the weather be hot, a piece of perforated zinc, should be replaced over the centre hole in the stock. In good seasons between twenty and thirty pounds of pure honey may be taken by this means, and the honey is much better than that taken from the stocks both in quantity and colour. Early swarms sometimes themselves throw off swarms: these are called virgin swarms, and the honey from them virgin honey. They should always be returned to the parent hive or joined to a weak stock.

1345. Beehives may be formed from various materials, the selection depending partly on the country or district in which they are used, and partly on the taste of the apiarian. Osiers, rushes, sedge, and straw, have all been put in requisition for the purpose; and Bonner, an eminent bee-master in Scotland, proposed making them of earthenware: this material was formerly used in France, and is to this day in some of the Grecian isles. In North America they are formed from the hollow trunks of amber-trees, cut to a proper size, and covered with a board to keep out the rain: in Apulia, the trunk of the giant fennel is used after clearing away its fungous pith; in other parts of the South of Europe the bark of the cork-tree is employed, which, being easily separated from its trunk by one perpendicular and two circular sections, forms a hive at once, only requiring the closing of one seam, and the addition of a solid top to keep it steady on its pedestal. Hives of this simple form, or the hollow trunks of trees, afforded, probably, the earliest domicile of domesticated bees. Hasselquist, in his "Voyages and Travels in the Levant," states that the hives in Egypt are made of coal-dust and clay, well blended together, and formed into hollow cylinders of a span in diameter, and from 6 to 12 feet long, which, when dried in the sun, become so hard as to be handled at will. "I saw," says he, "some thousands of the hives at a village between Damietta and Mansora; they composed a wall round a house, after having become unserviceable in the use they were first made for."

1346. The common bell-shaped straw hives are too well known to need remark. For single hiving the nearer they approach in shape to the larger section of a circle, the earlier and the more frequently may the bees be expected to swarm. The Chelmsford and Hertford hives are considered best shaped and best formed. Straw hives have also been contrived for storifying; in France, these are said to have been invented by Bourdonnaye; in this country, Wildman has the credit of introducing them. They are called Moreton hives, on account of the form only,—the materials used being reeds, and not straw. Unblighted rye is the best straw for hives, and unthrashed is better than thrashed straw; for, being smooth and entire, it saves the bees a good deal of trouble, as they always rubble away the rough spiculæ on the inside of a new hive. "The best size for a storifying straw hive," says Dr. Bevan, is 9 inches high by $11\frac{5}{8}$ wide at the top, gradually tapering to $10\frac{1}{2}$ inches in the clear. For single hiving on the Grecian plan, the hives should be $13\frac{1}{4}$ inches in diameter at the top, and taper gradually downwards to $12\frac{1}{2}$. This size will admit eight bars, which, on the removal of the side-combs, will leave a better supply for the consumption of the family than if the hives were smaller and the bars fewer, and afford the owner a prospect of preserving his bees through the winter without feeding. The importance of all bee-boxes being of the same dimensions, has already been dwelt on; and it is, of course, equally important with respect to straw hives. In making these hives, the lowest round of straw should be begun upon a wooden hoop, the bottom being placed smooth, that it may sit closely to the floor-boards, which, besides making mortar or luting needless, will allow a more easy movement of the slide in the floor-board. Hives on stone or plain boards must, of course, have entrances cut in the wooden hoop, three inches long and three-eighths of an inch high. The hoop should be perforated through its whole course, the perforations being made in an oblique direction, so distant from each other as to cause all the stitches of the hive to range in a uniform manner. The hoop may be first pierced with a gimlet, and the holes completed by a very small rod of hot iron, introduced from the inner side of the hoop, so flattened as to make the perforation correspond as nearly as possible with the bramble-splits, which are to be drawn through them. The stitch-holes in the hoop should be filled with putty after the hive is finished. The bars should be of the same width, and placed at the same distances from each other as recommended for the boxes; and the top of the hive should be so constructed as to form a rabbet for the ends of the bar to rest on. This is sometimes accomplished by having a band of straw worked round the top exterior, and upon a level with the usual finishing band, surmounting this with another round, corresponding in diameter with the thickness of the bars,—namely, half an inch. This obviates the necessity for stopping with cement as completely as the rabbet of a wooden box, and gives a finished appearance to the hive,—the two bands forming a cornice round it. The direction of the bars should always be from front to back. Centre-boards and floors, with sunk entrances, will be equally advantageous for storifying hives; as for boxes, the outside covers should be made of straw like round mats, wide enough to extend beyond the edges of the hives. Those who wish glass windows in straw hives may accomplish this object by cutting through several of the bands of straw in two places, three or four inches asunder. Mr. Golding effects this by thrusting two strong wooden skewers through the bands of the hive, a little further apart than the desired width of his windows: these give such firmness to the part, as to admit of the openings being cut with tolerable precision. The windows are generally cut opposite the entrance, and about the centre; but they may be made at any part of the hive. The ends of the cut straw bands may be secured by packthread, or softened flexible wire, the panes of glass fastened with putty, and the light excluded by a wooden shutter or dark curtain."

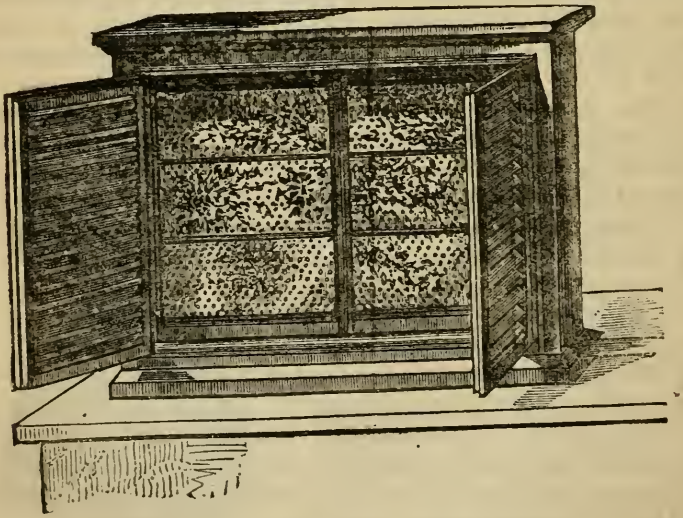

COTTAGER'S HIVE.

1347. The cottager's hive, manufactured by Messrs. Neighbour & Son, is a valuable and cheap contribution to the economy of the apiary. It consists of three common hives, with floor-board, and is recommended to those who are desirous of putting their poorer neighbours into the way of keeping bees on the improved system. Another contribution of Messrs. Neighbour & Son is the improved cottage hive, represented in the next page, where three bell-glasses are in operation. It is neatly and strongly made of straw, having a novel and rather ornamental appearance, whether it is by itself or arranged in rows. From each of these glasses the purest honey can be taken from time to time, at the most vigorous period of the season, with great facility: it has three windows in the lower hive, with thermometer fixed to the centre one, and stands two feet high. Price, 35*s*. An elegant zinc cover is prepared for this hive, standing on three iron rods on the lawn, which is a useful protection to the bees. Neighbour's unicomb observatory hive is a great novelty: being constructed with glass sides, and admitting of one comb only, the hidden mysteries of the hive are continually exposed to the full light of day. It is furnished with outer glass doors to keep up a uniform degree of heat, at the same time the view of the whole of the interior is in no way interrupted. Height, 24 inches. Price, £3. 3*s*.



IMPROVED COTTAGE HIVE.

1348. There is another form of straw hives which Dr. Bevan thinks advantageous to the cottager. It is called the village hive: the body is designed to be used permanently. The upper portion, which will generally contain nothing but pure honey, should be removed annually, or oftener, if the season permit. This is a great favourite in some parts of France, particularly in the neighbourhood of Narbonne. To obviate the inroads of the wax-moth, and the disadvantages arising from the annual diminution in the size of the brood-cells, some of the old combs in this, as in all other hives with loose bars, may be removed as required; the bars being then replaced, armed with guide-combs, will soon be refurnished. This operation should only be performed

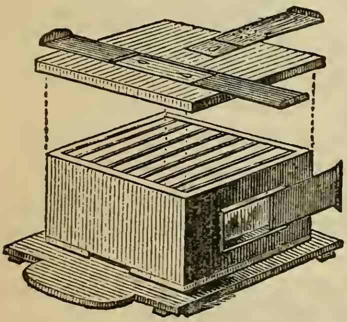


NEIGHBOUR'S UNICOMB OBSERVATORY HIVE.

partially in one year, and February is the best time. Out-door hives should be protected either by straw caps or a shed. A shed should have folding-doors at the back, and should be inclosed on every side, except where it is necessary to have openings for the bees. The roofs are usually inclined to the back, to protect the bees from rain-drippings in wet weather; but if it were sloped in the opposite direction, overhanging considerably, and spouted, it would afford a much better protection, besides allowing the owner more convenient access to his hives.

1349. Every bee-house or bee-shed should have a block of wood, about six inches long and three inches wide, between the front wall and the hives, with a sufficient opening for the bees. The disposition of the bee is to construct its brood-combs of one uniform thickness, and at nearly one uniform distance from each other; whilst the thickness and relative distances of the store-combs are subject to variations, the honey-cells being often so elongated as for a single comb to measure from two to three inches in thickness. Hence arises the difficulty in adjusting the bars of a hive to such distances as shall be uniformly applicable to practical purposes; for if the breeding distance were closely adhered to for all the bars (and it is impossible to know how many will be required for brood), some of the outer ones would be found to approximate too much for the attachment of store-combs, and in all such cases the bees would be found to depart from the arrangement required for brood-combs. If, on the other hand, a full allowance were made through the whole range for the construction of honeycombs, they would deviate so widely from the breeding distances as to lead to disappointment from another cause—the bars would be too far asunder. Hence arises the difficulty of surmounting a hive with bars capable of easy removal under all cases. Mr. Golding in his arrangement exceeded the breeding distances by the eighth of an inch, placing his bars so as to measure 1⅝ inch from the centre of each to that of the next one; a departure from the natural distances so slight as not to be objected to by the bees for brood-combs, while it enabled him to meet the elongation of the honey-cells and the increased thickness of the outer combs. His ingenuity did not stop here, however; for it was still found that the bees' proceedings were liable to uncertainties, and that they did not always take the hint of their proprietor, but occasionally constructed combs diagonally or transversely across the bars. To obviate this, he attached to the centre bar a piece of worker-comb an inch or two in depth, which the bees readily followed out, and always employed as the foundation of their first comb. This regulated the position of all those successively constructed on each side of it, and the hive having been furnished with bars of a proper width and correctly placed, the bees were induced to construct a uniform range of combs, every guide-comb being attached to a separate bar. But, as even thus arranged, deviations take place, it is a good plan to place a guide-comb on every alternate bar. Thus furnished, as soon as a hive becomes filled with store, one, two, or more of the outer bars may be removed and exchanged for unoccupied ones, without disturbing the brood-combs, and with very little disturbance to the bees ; all annoyance from the removal being prevented by having an assistant at hand to whiff a little tobacco into the hive at the moment of removal. The guide-comb must be fixed in line with and upon the centre of the bar.

1350. The bar-hive system is strongly recommended by Dr. Bevan, and perfected by Mr. Golding. It usually consists of a pair of boxes ; the lower one being the *stock-hive,* or usual residence of the family, and breeding-place of the queen or mother-bee, and which need rarely be disturbed. The other is for the purpose of affording the bees occasional additional storing-room, and is termed the *super-hive;* its place being over the other. The boxes are of 1-inch wood, 11¾ inches square withinside. The stock-hive is in inside height, *including the bars,* 8½ inches. Making deduction for the bars, these dimension gives a shallow hive, but adapted for the health of the bees. It is evident that in the use of bars the bees are more constrained in their building operations than where they are free to follow their own inclinations as to the position and mode of communication from comb to comb. In the Amateur's Bar-hive this dilemma is met by a passage from one part of the hive to another. For the space of two inches, at each extremity of the upper side of the bars, they are cut out horizontally through half their thickness. In this way a gallery is formed all around the upper part of the dwelling, not only as a means of equal ventilation and temperature, but as offering facility in the removal of the bars. A cover nearly an inch thick, clamped at the ends, and projecting on all sides half an inch, is fixed down close over the bars with two or three long screws. Our engraving shows the cover lifted above its box, in order to exemplify the arrangements thus described.



1351. A groove of about an eighth of an inch deep, and 5¼ inches wide, is recessed out of the cover, running in the same direction as the bars ; within the part so sunk four holes, 3¼ inches long and half an inch wide, are cut through, laterally, two at each end ; their position being on the two sides of the centre bar. These two sets of openings must be so situated as to leave a clear space in the centre of the cover of 2½ inches ; and they form the communication between the lower and upper box. To stop this, when required, two slides or dividers are introduced into the recess, one at each end : these are made of strong well-flattened zinc. The dividers are 6½ inches long, and an eighth of an inch less in width than the recess, to work easily ; their outer extremity is a little turned upwards for convenience. When in their places, the dividers will meet in the centre, their turned-up edges coming in contact with the super-box.

1352. Bee-keeping, which, in this country, is an insignificant branch of rural economy, forms, in most continental countries, a honey-manufactory on a large scale. Let us see what is doing in other countries in this branch of rural economy, especially in Germany, Poland, and Russia.

1353. Poland has always been a great honey-producing country; the provinces of Podolia, the Ukraine, and Volhynia, probably surpass all others in the management and products of their apiaries. Hungary, Bohemia, Moravia, and Germany at large, where the winters are much more severe than with us, produce large stores of honey, and make it an article of considerable commerce; but Poland is, *par excellence,* the country of honey. There cottages are found with small portions of land attached, on which may be seen as many as fifty hives, while there are farmers and landed proprietors who possess from 100 to 10,000 hives: in fact, it forms an important source of income, collecting, as some of them do, 200 barrels of fine honey, of 500 lbs. weight each, besides wax! Why should the English husbandman be so far behind the people of other countries in this, while he is so far in advance in other productions of the soil?

1354. The forests of Poland abound in oak and pine, and bee-keepers employ no other material in the construction of their hives than the latter. They use boards an inch and a half thick, thoroughly seasoned, and they join them together with wooden nails. The hives are from three feet six inches to five feet high; the shape is that of a truncated cone, eight inches in diameter at the top and twenty inches at the base, increasing at the bottom two inches for every half-foot beyond the minimum three feet and a half. The top of the hive is a round lid let in about an inch deep, with a projecting coping, and a handle to raise it when it is necessary to take it off. The upper part of the hive is firmly and closely corded round with a rope the thickness of the finger, which renders it impervious to rain or the weather. A triangular opening, about six inches from the bottom, admits the bees, and a door in the back of the hive, eighteen inches long, permits the keeper to inspect the progress of the hive and the removal of honey. The roof of the hive is covered with a clay pan of large size, but an inch smaller than the lid in diameter, placed in such a manner that it can be raised when required.

1355. Almost every farm throughout Poland has an orchard sheltered from the north winds by the farm buildings; a portion of this is always employed as a bee-garden. In other places, where the landed proprietors possess bee-gardens, they choose low dry positions in valleys, at the foot of hills, on the borders of forests surrounding the apiary, with a wooden fence six feet high, and a ditch behind it to carry off water. Within this inclosure, the hives, as we have described them, are placed.

1356. The turf is pared off for two feet round the hive, and the whole surface strewn with clean sand. On this plan the hives are placed; the first row five feet apart; the second row occupies the intermediate space in the rear of the first; the third row is in a line with the first; and so on throughout the garden, the whole space being thus filled up with hives five feet apart each way. They are placed, if possible, on the south-east slopes, so that the first dawn of the morning sun falls on the entrance to the hive, thus rousing the workers to their daily task. The bottom of the hive is laid round with clean moss, and it is the duty of the bee-keeper to keep everything in perfect order, and prepare new hives for the young swarms thrown off in the summer.

1357. When the honey-harvest arrives, a new hive is provided for the colony of bees; and some evening, when all the bees are at home, the new hives being smeared with honey, the bottoms of both are opened, and joined together, so that not a bee can escape. Smoke is now introduced at the top of the old hive, which drives the bees out, and they are secured in the new one, which is placed in its standing-place.

1358. The honeycombs extracted from these store-hives are of two qualities: the honey from the early summer flowers is of a light colour, while that from autumn flowers is of a darker hue. The combs containing the latter are drained into separate vessels, and its produce is considered the richest in quality, and commands a higher price, while the wax is prepared by bleaching, and formed into the candles so much in request in all Roman Catholic countries.

1359. A convenient bee-feeder has been invented by Messrs. Neighbour and Sons, of which we append a figure. The bottle is filled with the liquid food, the net fixed over the mouth with the India-rubber band; place the block over the hole of the stock-hive, the bottle inverted, the neck resting within the hole of the block. The bees put their proboscis through the perforations and imbibe the food, the bottle acting on the principle of a fountain. Being glass, it is easy to see when the food is consumed.

* * *

CHAPTER XXVI.

MONTHLY CALENDAR.

§ 1.—ASPECT OF THE MONTH.

1360. It is now summer everywhere; in the deep woods, beneath the shady hedgerows, even in dell and dingle, where twilight reigns at noonday, the warm breath of summer penetrates, — the fertilizing showers have fallen. The fragrance of the meadow-sweet mingles with the aroma of the sweet-scented briar and of new-made hay. On flowery banks and hedgerows the graceful convolvulus climbs and flowers. The wild briony throws its glossy tendrils round everything it comes near. Wherever the eye alights, the ground is covered with flowers:—

> "Here mantling snug beneath a verdant veil,
> Bright creepers draw their horizontal trail;
> Wide o'er the bank the slender tendril bends,—
> Adown the bank the rooty fringe depends."

1361. The month of July is the hottest in the whole twelve, the mean temperature being 61°, although the thermometer ranges from 82°, and sometimes falls to 42°. This high temperature is chiefly occasioned by the increased radiation of heat at the earth's surface: in consequence, the nights are much warmer than those of June. A period of rainy weather usually occurs about the middle of the month, accompanied by thunder-storms, which have given rise to the popular tradition respecting St. Swithin, who is supposed to baptize the apples in this series of rainy days.

1362. "The weeds of one country," as Dr. Edward Daniel Clarke remarks "are the flowers of another;" and truly a glance at our garden parterres serves to carry us in imagination to many a distant clime. The damask rose, now in the fulness of its bloom, grows wild in the sunny plains of Syria. The hollyhock, once known as the "Foreign Rose," and now common in every cottage garden, is of Eastern origin. Fuchsias, which now have their crimson and purple bells in every garden, were brought by enterprising travellers from the depths of untravelled Mexican forests, where, half-hidden beneath their tropical foliage, stand the ruins of vast and richly-sculptured temples and palaces of the Montezumas, where also was found the passion-flower, whose cruciform shape, which to the imaginative and superstitious Spaniard was a type of Christianity, demanded of him the conversion of the country, to accomplish which he waded through seas of blood,—the jasmines, among the oldest and sweetest of our garden flowers, especially the night-blooming jasmine,

"which keep
Their odour to themselves all day;
But when the sun-light dies away,
Let the delicious fragrance out
To every breeze that roams about,"

is still in great request among the women of the East, who are accustomed to decorate their hair with its flowers.

1363. And then the verbenas—brightest ornaments of the parterre—for which we are indebted to the New World, both North and South—how vivid their colouring. In fact, the East and the West have been ransacked to deck our flower-beds. "China and Cathay, and the further Ind."—no country under the sun is unrepresented in them. The frozen plains of Siberia send us larkspurs, golden California her Clarkias, and Brazil the petunias.

1364. The early garden fruits are also now in perfection; the black currant hangs like glittering rounded jetty beads beneath its fragrant leaves; the gooseberries can scarcely contain themselves within their hairy husks of green and red; white and red currants hang like pendent pearls and corals from their broad-leaved boughs, and strawberries, ripe and ready for the banquet, peep from under leaves.

§ 2.—Flower-Garden and Shrubbery.

1365. The angularity observable in recently planted-out flower-beds is wearing off as the plants approach each other, and harmony begins to prevail as the symmetry of the design develops itself; for here, as in other works of art, the object is to conceal art. If the several parts harmonize imperfectly with one another; if the curve of the outline by which the beds are confined is too sharp; or if, on the other hand, disorder and irregularity meet the eye, and the parts jar with each other, then the design is incomplete, and something is still required to bring all its parts into harmony. All strong-growing plants, such as asters, helianthuses, and solidagos, should be attended to, so that they all grow together. Hollyhocks planted on the lawn, whether singly or in groups, should be staked in time: in fact, they should be staked when planted, and the leaves and plants kept in a healthy state, by watering and syringing in hot and dry weather. Tie up œnotheras neatly. Speciosas, planted pretty thickly over the beds, will produce a fine mass of white flowers, if trained so that they have plenty of light and air, and watered abundantly in dry weather; metrocarpa and Matricaria grandiflora, also, will well reward the labour. Beds of verbenas, and similar plants, require occasional syringing with weak tobacco-water.

1366. *Rose-Garden.*—Autumn-flowering roses now require a liberal supply of liquid manure; guano sown on the ground, and thoroughly soaked with rain-water, will serve the purpose. Remove faded flowers and seed-capsules every morning; plants which have flowered in pots, keep growing freely, as the future bloom depends on their vigorous growth at this season. Climbing roses should now be pushing out strong shoots from the roots and main stem; if not required for future training, these should be taken off entirely, or have their tops pinched off a foot or so from the stem. Budding should now be in full operation, watering the roots and plants freely in dry weather, both before and after budding. Cut back perpetual-blooming roses, and water them with the richest manure-water to encourage a second growth and bloom. Baskets, vases, &c., will require an occasional regulating; those having plants in them requiring to be tied up, should be examined for the purpose; afterwards they may be allowed to grow in a freer style. Convolvuluses, maurandias, lophospermums, &c., after being pegged over the surface of the soil, should be left to grow over the sides of the vases, or allowed to ramble among the more formal plants which fill up the centre. Baskets, cases, or other contrivances containing plants in bloom, will require frequent attention to keep them fresh. Remove everything in the shape of decayed bloom or leaves, and take advantage, when a number of fresh plants are wanted, to effect a change in the arrangement, which will be found more pleasing than adhering to one plan. For the same reason, plants under verandahs, or arranged for effect near the house, when undergoing revision for the purpose of adding fresh plants, will be more interesting when variety in arrangement, or in the kind of plants, is introduced as often as they are changed.

1367. The first week or so will be chiefly occupied by the usual routine of pegging down plants intended to be kept dwarf, tying others up, and keeping the surface of the beds free from weeds until it is covered by the growing plants. If pinks are attacked by wireworm, place pieces of potato just below the surface of the soil. Examine these every morning, and a great number can be thus caught and destroyed. Pinks should now be propagated; cuttings may likewise be put in of tea and China roses, selecting wood of the present year when it becomes a little firm at the base. Roots, bulbs, anemones, tulips, crocuses, scillas, tritillarias, &c., which have been out of ground some time to dry, should be properly labelled, and put by till autumn. Where a nursery or reserve garden exists for supplying the more common kinds of plants, the propagation of various things can now be proceeded with. Keep the smaller and seedling plants free from weeds, and lose no time in sowing perennial and biennial flower-seeds for blooming next season.

1368. Quick and privet hedges should be closely cut in with the shears: let them bend off a little towards the top, which gives them a better appearance. Hedges of large-leaved plants, such as laurel, Turkey and Lucombe oak, and sweet bay, must have the young wood cut back by the knife, as the shears would destroy the beauty of their leaves by cutting them.

1369. Shrubs grown to embellish Italian and geometric flower-gardens, terraces, &c., should now likewise be cut into the figures they are to assume: in many cases wires will be necessary to keep the branches in their proper places at first; afterwards the knife and shears will suffice to keep them in their proper form. Portugal laurels, cypresses, arbor-vitæ, yews, bays, and tree-box, are the plants best adapted for this purpose; and when cut into architectural figures, they form fine accompaniments of the above style of gardening. They should, however, be clipped *in* two or three times during the season, to preserve correctly the required outline. If any bedding-out plants still remain in the nursery-beds, they should be taken up with as much of the soil as possible, and planted in their allotted place,—in showery weather, if possible; if in dry weather, water copiously after transplanting.

1370. *Tender Annuals.*—Cockscombs, balsams, and other curious annuals, may now be brought out of the frames, cleaned, and top-dressed, and tied to suitable sticks, and copiously watered all over, the leaves syringed, if needful, and the plants placed where they are to stand and flower.

1371. *Annuals* for autumnal flowering may now be sown, and perennials and biennials sown in March transplanted. Stock July flowers—sweet-williams, Canterbury bells, scarlet lychnis, and others of the class—may now be transplanted into nursery-beds prepared for the several sorts; or any of them may be planted at once in beds or borders where they are to remain.

1372. *Bulbous* plants which have flowered should now be removed, the offsets separated from them and placed in dry earth to ripen; and prepare for planting again in October the small offsets planted in a nursery-bed, there to remain for a year or two till they reach maturity.

1373. *Borders, Beds, and Shrubberies.*—Order and neatness should now reign in the beds and borders; weeds should be rooted out as they appear, by hoeing or hand-weeding; each individual flower carefully adjusted, the beds and borders, where not covered with plants, neatly raked, forming a clean and even surface, gently sloping to the edges, the clumps and evergreens free from confusion, unless the effect intended is a thicket of underwood. If the shrubs stand apart, let the ground be hoed and neatly raked; all flowering shrubs and evergreens pruned of all straggling shoots, and put in order; all herbaceous plants staked and tied in a neat and regular manner, and all decayed flower-stalks, flowers, and leaves, be cut down or removed.

1374. *Fuchsias, Geraniums,* and other plants in flower, now require regular supplies of water. Hollyhocks are advancing to flower. Mulch the roots and water well, and keep them neatly tied to their stakes.

1375. *Florists' Flowers.*—Take up tulips whenever the weather will permit. When lifted, do not separate the offsets from the parent bulb, or remove the roots or skin: these had better remain till a later period. When lifted, ridge up the soil of the beds for exposure to the air. In taking up seedlings, great care must be used, as their bulbs will often strike down from four to six inches. If possible, keep the stock of each separate; this will save an immense deal of trouble hereafter. Tie carefully the spindling shoots of carnations and picotees—not too tightly; keep the pots free from weeds, and in dry weather do not let them suffer from drought. Attend to the fertilization of pinks: a very little attention to this interesting operation will insure a good crop of seeds, and by selecting only excellent varieties instead of trusting to chance and gathering promiscuously, a much more abundant success will be the result.

1376. By the end of the month, seedling ranunculuses should be taken from the pans or boxes in which they may have been grown; but as many are so minute, and so like the colour of the soil, that without great precaution, some may be overlooked, the best way is to put soil and roots together in a fine wire-sieve, and by holding it under a tap, or pumping into it, the soil will be washed away and the roots left; they must then be placed in the sun for an hour, and afterwards removed to an airy shady place to dry gradually. The large roots of named varieties must be taken up at once, if not already done; for should they start again, which they are very apt to do previous to their removal, their death is inevitable. Continue to put in pink pipings; disbud carnations and picotees, giving occasional doses of liquid manure. Attend sedulously to dahlias; tie as they require it, and give a good supply of water.

§ 3.—The Mixed Flower and Kitchen Garden.

1377. The style of garden kept in view under the above head will most frequently be found attached to middle-class houses, farm-steadings, and parsonage-houses, in all of which it may be assumed that the space is limited. Where a little of everything is to be produced with small means, the market-gardener's maxim of "planting whatever is ready," must, to some extent, be adopted. It would be well, perhaps, if the example of the market-gardeners round London were to prevail on some other points of garden culture. Mr. Cuthill has scattered a few remarks on the mode of culture pursued by himself and his brethren, through the pages of the *Gardener's Chronicle,* from which we glean a few remarks bearing on this subject, and more especially applicable to farmhouse gardens, where they might be adopted with advantage.

1378. Towards the end of October, a well-conducted market-garden is full of cabbages just planted out, which, in November, are strong healthy plants.

Before planting, however, the land is heavily dunged, a two-horse load being used for every thirty yards, which is dug into the ground as it is trenched, the planters following the diggers. This work is carefully superintended; every man has his twelve feet measured out to him, and the foreman walks before the workmen to see they do their duty. The lines are run along the land as soon as it is ready, at distances two feet apart, trod on in one direction all over the field. The lines are then shifted, and placed at right angles to the other, at the same distance apart, the workmen now only treading on the angles. This done, planting commences; the plants, which are usually large well-grown plants, are inserted at the angles; consequently, the plants stand two feet apart each way. Immediately after planting, the hoe is sent through the field to loosen the soil; this is frequently repeated, but no earthing up. It is one remarkable peculiarity of this mode of culture, that slugs are unknown in a well-managed market-garden; the continual stirring and deep trenching seems to root them out. The moment these cabbages are off the ground, the land is again trenched, and prepared for a fresh crop.

1379. Growing seakale is, perhaps, the most interesting of this manufactory of garden stuffs. In March, a piece of ground, which has been prepared by trenching and manuring, is planted with asparagus, by drawing a drill three feet from the fence and two inches deep, and the seed is sown thinly,—that is, in patches about six inches apart, which is afterwards thinned out to a foot apart by drawing the weakest plants. The next row is sown in the same manner, 18 inches from the first; for the alley and side of the bed five feet are allowed, so that there are alternately two rows of asparagus 18 inches apart, and a space of five feet left vacant.

1380. The first year these are generally sown all over the ground; the second year a crop of lettuce is sown, or any other light surface-crop. In the third year the beds are formed out, and a few inches of mould dug out of the alleys and placed on the crowns; but only a few of the finest heads are cut this year. In autumn, when the haum has been cut down, the ground is forked over, and planted with cabbages, coleworts, or winter greens; in spring, the crowns are covered 8 or 10 inches deep with mould from the alleys. When the season for cutting arrives, a fair crop of heads must be left to strengthen the young buds for next year's growth, but not one head must be allowed to shoot out until the cutting is over. At the end of the fourth year, when the haum is ripe, it is cut down, and the mould thrown back into the alleys, thoroughly mixed and enriched with manure, and planted with cabbages of the various kinds.

1381. In the case of seakale, the vegetable is always forced for market. Towards spring, after the crop has been secured, new beds are made by cutting off the thongs or leaves from the old roots, and laying them by for a few days to become callous. The ground is prepared by deep trenching and manuring, and the roots planted out a foot apart, and in rows 18 inches from each other, and a crop of lettuces is sown between them. As soon as the buds become visible, every one is cut clean out, except the oldest, and the ground is kept clean till November, and cropped with celery planted in well-dunged trenches six feet apart, with two or three rows of lettuces or coleworts between, for the market-gardeners do not mould up celery until it is well advanced and 18 inches high, so that there is time for a crop of coleworts or lettuces to come off. When celery is removed, the ground is cropped with winter greens, and again cleared off by the 1st of March, when it is again dunged and trenched, and sown with onions; sometimes with lettuces planted in the beds as well as in the alleys. When the onions come off, the ground is again trenched, and again planted with cabbages or coleworts. Next spring a crop of cauliflowers, gherkins, cucumbers, or French beans, will probably be taken off; but the grand point is to keep the ground constantly occupied, to see that every inch is cropped all the year round, that the boundary-hedges are in good order, very dwarf, and without ditches.

1382. It has probably struck many as an unusual thing to crop the fruit-garden and orchard, as the market gardeners of Fulham and Chiswick do. All the large plantations of apples, pears, and plums, of which Mr. Fitch alone has fifty acres at Fulham, have every young shoot made during the summer pruned down to two or three buds from last years' wood, after the manner of currant-bushes; in this way they look well, and bear enormous crops, while the ground under the trees is cropped with rhubarb, currants, gooseberries; and during the winter with coleworts and spring cabbages. Even the asparagus-haum is cut down, the ground is forked over, and it is planted with coleworts, alleys and all, as are the rhubarb-beds when the leaves die down.

1383. Another way market gardeners have of increasing seakale, is to cut off all the thongs, and at taking-up time, and in November, the small prongs or end-roots are at once cut into four pieces and laid together in a heap for the winter. In February they are deposited thickly in beds and covered an inch deep with mould; when they sprout, the ground being prepared, they are planted out and treated as above. This plan it is said produces the finest plants, as the whole vigour is left in the root, when cut off in winter.

1384. Of course, under a system like this, all liquid manure is carefully economized and conveyed to tanks, whence it can be distributed over the ground when required; generally, however, being distributed on the ground before digging, under the impression, according to Mr. Cuthill, that applying sewage-water after the crop is in fills up the pores of the earth, and prevents the heat and air reaching the roots.

1385. The system of growing asparagus is as follows:—When the frames are all removed, the forcing-trenches, which are two feet deep, are filled with hot dung, and planting for forcing commences. The seakale-roots are dug up, all the small buds round the main eye are pared off, a furrow is cut out with the spade across the bed, and the roots are put in as thickly as possible. The next furrow is cut out four inches from the first, and planted in the same manner. The planting finished, from four to six inches of straw is placed over the crowns; the beds are hooped over, and straw placed over the hoops. "In this way," says Mr. Cuthill, "I have known 50,000 heads forced by one man in a season. All air is excluded, the vegetable is forced slowly, and of delicious flavour."

1386. *Geraniums.*—Those of our readers who are admirers of the geranium as a bedding-out or standard plant, will not be sorry to peruse some of our veteran friend Mr. Donald Beaton's experiences in propagating them. "Late cuttings," he tells us, "are very useful. Now, suppose any one had an early plant of the Imperial Crimson, and were to begin this week to propagate from it, how many plants ought it to yield by October? Recollecting that all geranium-leaves will root from the foot-stalk; if the bud at the bottom of the foot-stalk is taken with it, any moderate striker might turn every geranium-leaf now in the country into a perfect plant by the natural heat of the season. A great part of my cuttings of the Imperial Crimson were put in this time last year (July, 1858), with little more than the bud to each cutting. The whole number were put in on a flat piece of level ground, in the centre of my kitchen-garden, right full in the sun, and never a thing between them and the sun; and there they stood till Mr. Henderson bought them; but they were watered every evening. The middle course between the early June and late September propagation is what suits us all, and there is more in it than many good practicals are aware.

1387. "By the end of July, on the average of seasons, the growth of most bedding geraniums is just at its prime for cuttings—it is neither too rank, as it will be in another month, nor is it in any way stinty. Cuttings made from spongy sappy late growth will need about double the care in looking after them during the winter, and are only fit for where lots of glass and good gardeners are kept. The effect on rank late cuttings is this: the amateur must keep them more dry in winter than the gardeners, because he has less command of heat and room, and when you come to that, the thick soft wood of the struck cuttings will shrink considerably; in three months the sap-vessels get closed like drains, into which elm-roots have found their way; and when the spring sap rises, it gets up as slowly through those choked passages as the snow-water and spring rains find their way down among the elm-roots. The mere effect consequent on this bad wintering, is the length of time it takes to get these plants into a fair bloom after they are planted out in beds. Did you ever observe that some people's beds are in bloom the next week after planting, and never cease from them, while others hardly ever get a decent truss in less than three weeks, besides having all the old leaves browned with the sun? But when the sun is at its hottest and most sultry and stifling point, leaves do not brown nothing like it. When the passages up to the leaves have become sunk and shrivelled, the leaf-stalk is then too stiff to bend; it holds on, the leaf cannot droop away from the sun, and so is scorched to the point of browning; and few lay it to heart, or seek out and fathom the cause, putting the blame on everything under the sun, but the very thing that caused the vexation, and that thing was the injudicious selection of cuttings in the autumn before. Therefore, if ever you meet such cases as these in your own place or practice, just think upon what time you put in the cuttings, and you will find to a certainty that your tale would tally with my story; and the best thing you can now do is to square your practice with my experience, and let every one of your geranium-cuttings be well rooted by the last day of August; and the sooner you begin now the faster they will root, besides being in far better condition than they will be a month hence.

1388. "Then, as to the work itself, I have a most decided objection to strike autumn geranium-cuttings in pots, or on the north side of a wall, or anything, or under hand-glasses. But I see no objection to having them in shallow turf, or any cold pits facing the south or west, provided the lights are left off at night from 10 to 4 o'clock. The glass might be drawn over them, and a single mat put over the glass; but the mats should be off by 4, and the glass not later than 7, all through August; but by far the best place in the long run,—that is, looking to the winter and the planting-out time, is the hottest and most sunny place in the garden. I am quite certain of that. I have just now two or three kinds from seed, which are more dwarf and much more tender than the *Golden chain;* and the cuttings from them about St. Swithin's day could not be had over two inches long. Yet I put them close by the side of the plants on a hot border under a wall; but I put some of the same kinds into a close cold frame, and I never put cuttings in a hotter place in all my life than that cold frame was at that time. Those in the sun rooted better and faster, however. I put three cuttings of the *Golden chain,* and three cuttings of *Harkaway,* on the same border, and in the same frame on the same day for an experimental trial, which is now going on. But the same week I put in ninety cuttings of a particular seedling on that border; and not to lose one hour with them, I put a cradle over them, on which I put mats from 10 till 4 o'clock, and they were slightly damped twice a day, and the last thing at night, and not one single leaf drooped or turned yellow. It was on a Saturday afternoon, and by next Saturday I did without the mats, and the cradles were cleared off. The ninety cuttings were most of them twice and three times the length and substance of the *Imperial crimson* cuttings last June twelve months, and the latter had no sort of screen or shelter,—they stood in the middle of the garden."

1389. How often do we hear the wish expressed by people advanced in years, for some of the flowers of their youth,—"the old-fashioned flowers of childhood," which have been rooted out of so many gardens by more modern importations,—the gentians, for instance. The common gentianella is seldom grown now, and yet it was formerly grown with very little trouble:—Has the more perfect system of drainage withdrawn the moisture it requires? Nor is the beautiful G. verna so plentiful as it ought to be. "This little plant," Baines tells us, in his "Flora of Yorkshire," "one of the most beautiful of floras, grows well either in pots or the open border, if planted in a mixture of fresh hazel loam and pebbles, even amid the smoke of a city. On the Durham side of the Tees, thousands of acres are studded with its bright blue flowers." Why are these lovely flowers no longer common in our gardens? Sedums and saxifrages were occupants of old gardens in great request: so were rockets, globe thistles, Solomon's seal, honesty, and many such-like plants, once universal favourites. Can anything be more suitable for the border of the amateur or cottager's garden, than the aconites,—yellow and blue,—a free-flowering and very showy tribe, of which a selection of a dozen species may be worthy of cultivation. They are all propagated by taking up the plants as soon as they have done flowering, and dividing them into two or more parts, taking care that each portion has plenty of young roots or spongioles.

1390. The Adenopheras are very hardy, of easy culture, and of neat habit, and are also propagated by dividing the roots in April.

1391. The Rose Campion (*Agrostemma*) are pretty dwarf plants, propagated by seeds and division of roots in April, or by side-shoots in May.

1392. The Madworts (*Alyssum*) are favourite border plants, whose dense yellow blossoms make a very showy display planted in patches.

1393. The Bugloss (*Anchusa*) are fine showy plants, mostly with large blue flowers, are capable of propagating by slips, and dividing the roots into as many plants as there are heads, when they have done flowering, as well as by seed saved in the autumn, and sown on a warm border in the spring.

1394. The Arums are chiefly valuable in the garden for their broad and curiously-spotted leaves.

1395. The Thrifts (*Armeria*), pink, purple, and scarlet, are a beautiful tribe of plants, and worthy of a place in every garden.

§ 4.—KITCHEN-GARDEN.

1396. Probably this is the busiest month of the year in the kitchen-garden, both on account of everything growing so fast, and because many crops have ceased to be useful, and must be removed and give place to others. We have to look forward to a long winter and spring, when vegetation is stationary or very slow; yet at that time it is necessary to have suitable crops; and now is the time to prepare the ground and get them in their places. It is proper to observe that where rows of vegetables have previously grown, the ground is usually dry and hard. However moist the season has been, it will always be found different to that 18 inches or so on either side; it is not, therefore, advisable to crop immediately over the same spot; the difference will soon be observable between the rows planted exactly where peas have grown and those planted at the distance indicated. I have found it best not to plant winter crops on ground that has been newly-dug or trenched, and never knew broccoli do so well as when planted on hard ground that had not been dug since February; but when the plants had taken hold, and began to grow, the ground was forked over, and a dressing of manure worked in. I have also been informed by practised gardeners, that brassicæ are far more liable to club on loose or newly-trenched ground; but much may depend on the nature of the soil; it is, however, proper that stiff soils be dug some time previous to cropping,—especially in sowing small seeds, as turnip. The soil will dry in hard lumps at first; but advantage must be taken of the first shower that wets the soil through, as it will then readily fall to pieces under the rake. On light soils this is of less consequence, and it is as well to sow immediately after digging, as the seeds vegetate quicker. At this time, it is very necessary to keep the weeds down, as their growth is very rapid in showery weather; it is also beneficial to crops to keep the ground stirred between them, and collect all useless matter as fast as possible.

1397. *Asparagus.*—Cease cutting early this month, unless some parts can be spared for late use, when it must have a rest the following season. Late cutting has the effect of weakening the roots, but they will recover after a season's rest, if they have not been cut too closely. Hoe frequently between the rows.

1398. *Artichokes* will now be in bearing. Cut when the heads are about three parts open. These root deeply, and scarcely require water.

1399. *Seakale* should have an abundance of water, particularly young plants. Soot or wood-ashes strewn about them will, in a great measure, prevent the attacks of insects.

1400. *Beans.*—Pull up early crops as soon as they have done bearing; those advancing will produce better for being well watered, for which purpose make a groove each side of the rows, and give enough to soak the ground to a considerable depth: they had better be left alone than inefficiently watered.

1401. *Runner-Beans.*—Apply strong sticks if not already done. These may be kept dwarf by picking off the runners as fast as they appear; but it is much better to let them have full play by providing supports: the produce is tenfold greater.

1402. *Peas.*—If any are sown this month, let it be sorts that bear equally, or the shortening days will prevent their bearing at all. Dwarf early sorts are good to sow this month. Clear away any that have ceased to be productive, and stake any that are just above ground. As they grow quickly at this time, any delay in this respect will be inconvenient to the operator as well as damaging to the crop. Copious waterings will greatly benefit those coming into flower, but may be discontinued when they begin to pod, excepting tall sorts, which continue bearing and flowering at the same time.

1403. *Celery.*—During this month the main crop should be got out, directions for which were given last month. If this is planted where peas had previously grown, make the trenches between, not on the rows where the ground has been heavily drawn, or the crop will not be so good. It is very proper to give early crops plenty of room, so that, should they not be ready to clear away, such crops as this may be planted between, while they are growing.

1404. *Cardoons,* like celery, should be got out in the trenches, remembering that these crops require a soil highly enriched with manure; they should also have plenty of room and abundance of water: be not hasty in earthing-up.

1405. *Beet.*—See that this crop is properly thinned, and keep the ground well hoed between.

1406. *Carrots* may be sown any time this month; they will be useful in winter and spring. Sow on an open spot, and do not dig the ground deep; look over the main crop, and pull up any runners: they will be of no use if left. Take care that no weeds are allowed to grow amongst them.

1407. *Onions* may be sown now as salad in the autumn. Towards the end of this month some of the main crop will be showing signs of maturity, when they may be pulled up and laid on their sides, and thick-necked ones may be pinched; but this should not be done hastily, and probably had better not be done yet.

1408. *Leeks.*—Plant out the main crop on well-manured ground; plant in deep drills, or shallow trenches, for the convenience of earthing. This is a strong feeder, and should be well watered.

1409. *Potatoes.*—Pick off the flowers, if possible: if allowed to seed, it is said to diminish the produce, the tubers growing less in proportion to the quantity of seed allowed to ripen. Some advise cutting off the haum as soon as the disease becomes apparent. I am not certain of the efficacy of this remedy, but believe it does, in a measure, stay the progress of the disease, although at the sacrifice of size in the tubers.

1410. *Turnips.*—At the beginning of this month, a principal sowing should be made for autumn and early winter use, and again, towards the end, another principal sowing should be made. These will be useful in winter and following spring. I prefer sowing this broadcast, and using the large hoe continually, till the plants meet. Some, however, recommend sowing in drills a foot apart, and sowing soot, wood-ashes, superphosphate of lime, and other ingredients, at the same time. The seed must be protected from birds.

1411. *Surface Crops—French Beans.*—A late sowing of these may be made any time this month; for which purpose dwarf kinds, as the Newington Wonder, are best. Sow on unmanured soil; thin out those sufficiently above ground to four or six inches apart, and draw plenty of earth up to the stems, which will stay them in windy weather.

1412. *Lettuce* sown now will do well on a shady border, provided the spot is not too much overhung by trees. An open well-manured spot is best for them, if kept well watered.

1413. *Endive.*—Two sowings of this should be made this month; one at the beginning, another towards the end. Sow in the same way as lettuce, and plant out as soon as large enough to handle.

1414. *Tomatoes* should be carefully trained, and stopped as they grow. Stop just over a bunch of flowers, and leave no more shoots than can be conveniently trained. Unless the ground is very dry, they do not require watering, and will most probably do best without it.

1415. *Vegetable-Marrows* will be in active growth; and where they are planted on a manure-heap, or if liberally mulched with it, they will grow freely enough without watering; but, if planted on the common soil, they should be freely watered in the morning.

1416. *Spinach.*—It is not advisable to sow this month, unless for particular purposes; but the ground should be prepared for sowing next month, particularly if the ground is heavy.

1417. *Brassicas* (*Broccoli, Brussels Sprouts, and Savoy*).—The principal crops of these should be got out this month. Plant them in drills two feet apart, and 18 inches in the rows. If liable to club, dip the roots in a puddle of clay and soot before planting, or fill up the holes with wood-ashes, which will prevent it in a great measure.

1418. *Cabbage.*—Sow for coleworts early this month, and for early cabbaging about the end of this month: strew lime or soot over the young plants to drive away the fly. This should be done in the morning, while the dew is on them. Plant out for autumn use.

1419. *Cauliflower* sown now may be useful late in the autumn.

1420. *Mint,* and such-like herbs, should be cut for drying just as they begin to flower; *Savory, Sage,* and others, may be now propagated by cuttings or division; *Parsley* and *Chervil* may be sown now for winter use.

§ 5.—THE FRUIT-GARDEN.

1421. *Peaches and Nectarines* should receive their final thinning this month, if not done before. Some prefer allowing them to get large enough to use for pies, &c., before doing so; but the sooner the surplus fruit is taken off the better for the crop. Some little judgment should be exercised in thinning both wood and fruit; the object being to regulate both, so that a fair balance is maintained: if too much fruit is left on, the present year's crop will not be so good, nor will the strength of the tree be maintained for future bearing; if too much wood is left, the fruit is too much shaded, and the wood itself becomes weak: regulate both, so that the present crop of fruit has a fair chance of doing well, and just about enough wood is left to furnish the tree for another year, without having recourse to much pruning in the winter. Nail in neatly all the young wood, and give the fruit the slightest shelter of the leaves, and no more: too much shade deteriorates the flavour of the fruit, while none at all is apt to produce a premature ripening of it.

1422. *Apricots, Plums, Cherries, and Figs,* on walls, should be carefully looked over, and all shoots that are not really useful, or any that are ill-placed or cannot be properly nailed in, should be removed. It is important to do this in time, because, if neglected till the fruit begins to ripen, the real advantage of doing it is lost; and it is necessary to be long-sighted, and have an eye to future crops, as well as the present one; and if they are not nailed in, the disbudding ought in no case to be deferred. Figs, especially, are apt to make strong superfluous wood, the leaves of which throw a dense shade over the fruit, while the heat of the sun is so necessary to its ripening. The garden-engine should be played freely over wall-trees about two or three times a week, as this would wash off dust and insects, and maintain that cleanliness so conducive to health.

1423. Espaliers and dwarf fruit-trees should receive the same amount of attention. I consider the summer training and pruning of the greatest importance, since, when a bud or small shoot is taken off now, the wound is soon cicatrized, and no harm need be apprehended, while this is not always the case as regards the cuts produced in winter pruning.

1424. Standard trees are usually left to take care of themselves and their fruit during the summer time ; but good gardeners attend well to them, as to wall-trees ; nor is there any reason why this should not be done. I believe judicious pruning or stopping, and removing superfluous wood at this time, would prevent, in a great measure, gumming, canker, and immature decay in standard trees. Towards the middle of this month, apples are said to be christened by the showers which usually take place now ; still it is worth while to christen them artificially with the barrow-engine, and endeavour to keep the foliage and bark clean, and wash away insects, which are sure to swarm about them, although invisible. Time will also be well spent in thinning out the fruit if too thickly set. It is a grievous sight to a good fruit-grower to see the limbs of a tree borne down with the weight, and forebodes several unproductive seasons to come.

1425. *Vines* out of doors should be closely stopped and trained in. All the heat of the sun is necessary to the well-doing of this fruit, which cannot be expected to ripen in our short seasons, unless every care is taken to secure them all the light and warmth of the sun.

1426. *Gooseberries, Currants, Raspberries,* and other Bush-fruit. — Where they are left to ripen, it is often necessary to give these some protection from birds. I have found nothing better for the purpose than tanned netting or old herring-net, spread over and round the tree, completely covering it in: if an opening is left, the birds will get in. Blackbirds are very bold, and eager after these fruits, and are sometimes entrapped by this means. Caterpillars are often abundant on gooseberry and currant bushes ; and various ways are propounded for destroying them ; as spreading old tan under the bushes, and, at a certain time, burning it to destroy the larvæ. I have used no method but picking them off, or shaking them on to a cloth or sheet. By this means we have been freed from them, while others have been eaten up by them. A little practice in gathering them will enable the operator to destroy thousands in a very short time.

1427. *Strawberries.*—This is by far the best month of the year for making new plantations. There are various methods of doing it: that to which I give the preference is as follows :—The earliest runners are laid in 3-inch pots ; they are fixed in their place by means of small pegs ; in three weeks they have rooted into the soil with which the pots are filled. During that time they require an occasional watering, but may be planted out permanently as soon as rooted, placing them 18 inches apart in rows three feet apart. This is a clean and expeditious mode, and I find they bear the following year better than old plants. This is also the best mode of obtaining potted plants for forcing the following winter or spring. If for this purpose, they should not be dissevered from the old plants till they are well-rooted. They should then receive good culture till the autumn, when they may be stored in frames. Strawberries are sometimes grown on permanent beds four feet wide, and I have known them bear well for several successive years on heavy soils in this manner. Another method is to have them in narrow beds, two feet wide, with two-foot alleys between. When they have ceased bearing, the runners are allowed to trail over the alleys, and when they are well covered, the old beds are dug in. Next year the same is repeated: thus a succession of young plants are kept in bearing with very little trouble. Another mode is given in a former page, which is equally effective.

1428. There are times when the earth about the roots of fruit-trees, &c., becomes parched, so that the fruit is not properly nourished in the process of swelling or stoning. In dry seasons, this is a fertile cause of fruit being small and ill-flavoured. The following mode of remedying this evil, especially in the case of vine borders, cannot be too strongly recommended:—Perforated pipes are laid about a foot or 18 inches below the surface of the soil,—in the case of strawberry-beds, about six inches; from these a tube is carried to a convenient place for filling with water or liquid manure, with which they are charged twice a day, or as often as it is considered necessary. By this means a thorough moistening of the roots is effected, greatly to the improvement of the crops of fruit.

§ 6.—Flower-Cultivation under Glass.

1429. *Conservatory.*—The "sere and yellow leaf" is now apparent here: the work of decay has commenced; exotic bulbs have nearly finished flowering, and require now to be in a state of rest; those whose stems are still green should have water, in order to mature the bulbs. When done flowering, keep them in dry earth or sand, and in a warm situation, to ripen. Cinerarias and calceolarias require as cool an atmosphere as the house admits of; those which have flowered, cut down, and plant out in a light loamy border: sow seeds of both for flowering in spring. Cuttings of geraniums and most greenhouse shrubs may now be struck, and forwarded by plunging in a gentle hotbed, taking as cuttings only strong and healthy shoots three to five or six inches long, according to the size of the plants. These cuttings should be planted in pans, boxes, or pots of rich light compost, a few inches apart, moderately watered, and placed in a frame shaded from the midday sun till they are rooted. Soft-wooded plants like the geranium hardly require such delicate treatment, although they strike sooner under it. Cactuses, euphorbias, and other succulent plants of similar habit, can now be struck in beds or pots of light compost without the help of artificial heat, but root more readily in bark or hotbed and frame.

1430. Fuchsias, geraniums, achimenes, and salvias requiring larger pots, should now be shifted, removing the entire ball, and placing in the centre of the new pot, properly drained and half-filled with fresh compost, having first trimmed the roots and removed the outside soil; the pot is then filled with compost, well watered, and put away in an airy but shaded situation, to settle. All pots and tubs, especially orange and lemon plants, require stirring on the surface of the soil, and top-dressed and watered when required. Oranges, camellias, azaleas, and other hard-wooded plants, can now be budded or grafted; and in the beginning of the month, myrtles, oleanders, and jasmines propagated by layers.

1431. The stocks for budding orange-trees are raised from seeds sown in March or April in pots of rich earth, and plunged into a hotbed. In five or six weeks the plants will come up, when they are planted singly in thumb-pots, and plunged into a fresh hotbed, raising the frame as the plants increase in height, to encourage their growth. In August they will be eighteen or twenty inches high, when they may be removed into the greenhouse, placing them near the lights. In March or April shift them into larger pots, and plunge again into a hotbed, gradually exposing them to the air towards the end of May, to harden them ; turning them out from June till August. In the third summer they will be fit for budding, for which they are prepared by removal into the greenhouse, giving them plenty of air and light, but turning the side on which they are to be budded from the sun, and shading the whole plant from its fiercest heat. Three weeks before budding, the plant may be plunged into a moderate hotbed of tanner's bark, where it can have free ventilation.

1432. Hard-wooded plants, including most of the genera from New Holland, which bloom early in the spring, will about the middle of the month be so far advanced in their new growth that any requiring re-potting should at once have a shift. After turning them out, loosen the outside roots before placing them in their new pots, to enable them to take up the fresh soil more readily. Keep them close for a few days, especially if the roots have been much disturbed, and damp them once or twice daily overhead. Attention at this season should be directed to the stock of plants intended to furnish the supply of bloom through the winter, as it is requisite plants should complete their growth early for this purpose. Among heaths, those which flower through the winter should also be encouraged to complete their growth. Keep epacrises under glass till their growth is complete; but more air and light must be allowed them, increasing as the wood gets firmer. Towards the end of the month they may be placed out of doors in an open situation, where they can be protected from heavy rains. Young specimens should be carefully trained, the shoots neatly tied down or pegged, to insure a close compact habit ; the flowers of heaths and other plants done flowering removed; and stop all straggling branches.

1433. Such stove-plants as are intended to flower in the winter, as justicias, Eranthemum pulchellum, euphorbias, jasminums, &c., should be looked to. Many of these things require to be kept in small pots, and should be watered with liquid manure to grow them on without getting into too large pots. The last batch of achimenes may now be potted, and kept in a close frame for a late show of bloom. Fuchsias, if not in their blooming-pots, should be shifted into them at once. Encourage plants now established by using liquid manure. Young plants growing into specimens will require constant stopping and tying to get them into proper form. In shifting for the season, many conservatory plants will now be in the open air; but some of the New Holland, such as Boronita pinnata and B. serrulata, still require a little heat and pretty free stopping to insure handsome plants.

1434. *Begonias.*—There is no plant admitted into the conservatory more worthy of cultivation than the Begonia; and the facility with which it is cultivated is equal to its beauty. All they require is a good rich loamy soil, mixed with a little sand, and a little heat to start them in. Either hotbed or stove answers every purpose, provided there is a conservatory or greenhouse in which they can be flowered; the chief requirements being heat, moisture, and shade.

1435. There is a delicious fragrance about some of the species, which particularly recommends them for cultivation; others are recommended by their richly-variegated foliage and graceful habit, and they all hybridize with great facility. The following are a few choice sorts selected from 350 species known to botanists:—

1. B. fuchsioides, — remarkable for its graceful habit.
2. B. odorata,—remarkable for the fragrant odour, from which it derives its name.
3. B. nitida, — an almost perpetual bloomer, one plant having had three or four cymes of flowers always open for three years.
4. B. manicata,—produces a large mass of flowers at one time in the early spring.
5. B. octopetala,—a tuberous-rooted winter-flowering species, with large pure white blossoms.
6. B. splendida,—grown for its crimson velvety young leaves, which lose their beauty, however, as the plant approaches maturity.
7. B. splendida argentea,—equally beautiful; a pink tinge shining through the silvery hue of the leaves.
8. B. Griffithi, or picta,—richly-variegated, with colours shading beautifully into each other.
9. B. xanthia Reichenheimii,—in which green bands follow the principal veins, the spaces between being pure white.
10. B. xanthia lazula,—having copper-coloured leaves, shining with a fine metallic lustre.
11. B. xanthia pectafolia,—the copper-coloured leaves relieved with large distinct white blotches.
12. B. Queen Victoria,—a hybrid raised in Belgium; the leaf milky-white, except the margin of green dots, and a few central dots.
13. B. argentea,—the upper surface of the leaf of a pure delicate white.
14. B. amabilis,—the bright banded leaves very glossy and shining.

1436. Many other begonias, both distinct species and hybrid varieties, are in cultivation, nearly approaching these in beauty; but none will be found to exceed them.

1437. Balsams, thunbergias, and other annuals intended to decorate the conservatory and show-house for the next two months, should be finally potted, using soil of a light and rich description. Keep down spider with the syringe. Ipomœas, thunbergias, and other creepers, should be neatly trained to their respective trellises as they advance, keeping them fresh and healthy by frequent watering, and by picking off all decaying leaves; and, where the plants are flagging, water them with very weak liquid manure.

1438. Brugmansias, and similar plants of vigorous habit, should be frequently assisted with manure-water; as they are often troubled with the red spider, the engine and syringe must be kept constantly at work to keep them down, taking care, however, not to injure the fine foliage. Succulent plants, as cactuses, euphorbias, cereuses, sedums, and others of similar habit, require to be abundantly supplied with water, and also a full exposure to the sun, in order to obtain a fine bloom.

1439. Remove from the conservatory or show-house those plants which show, by their faded blooms, that they are past their best: their prolonged presence would detract from the freshness essential to beauty and good order.

1440. Achimenes, gloxinias, &c., out of bloom should be removed to a pit to ripen their bulbs. Clerodendrons, &c., in the same way may be transferred to vineries, or any place where there is a dry cool atmosphere.

1441. At no period of the year do heaths and hard-wooded plants in general require more care than the present, more particularly such as have been recently potted. To keep the old ball sufficiently moist to preserve the plant in health in the high temperature without getting the new soil in a sour state, requires great nicety in watering, supposing the plants to be under glass. At this season all the air possible should be given to the greenhouse and most stove plants, keeping it on all night.

1442. Greenhouse plants, after they have done blooming, should have a comparatively cool temperature, and no structure presents so many advantages for this purpose, as well as for growing delicate-leaved plants through the summer, as houses having a north aspect; while for the purpose of retarding plants, or for preserving them in bloom, it is indispensable. Such plants, therefore, as epacrises, leschenaultias, pimeleas, aphelexis, and others of similar habit, which have been kept for late bloom and are now over, should be placed in a house of the above description, or in deep frames, with the sashes turned towards the north, having first picked off the old remaining blooms; here, with gentle syringing once or twice daily, the plants may remain till the new growth commences, when any pruning they may require may be given, and afterwards placed in a more favourable situation for ripening their wood.

1443. Camellias, whenever the young wood appears getting ripe, may be removed to the open air: they thrive best in the shade; they must be placed on a dry bottom to prevent worms from getting into the pots.

1444. Chinese azaleas should also be turned out. Unlike camellias, they require full exposure to sun and air, and should be placed in an open situation, that their wood may become thoroughly ripened. It will, however, perhaps be necessary to place them for a week or two in a partially-shaded situation, to harden their foliage sufficiently to bear the full sun; or the sudden change from a house to full sunshine might cause their leaves to turn brown or burn.

1445. Orange and lemon trees will now be in bloom, and should be supplied with water at least three times a week in dry weather, and be occasionally supplied with liquid manure after stirring the surface of the soil and top-dressing. Orange-trees when too full of bloom should have the flowers thinned out. They are always in request for drying or distilling. The young fruit when too thickly set should also have a thinning. In order to procure dark glossy foliage, water with clear soot-water.

1446. *Pelargoniums.*—June and July are the best months for increasing this plant. Cuttings struck at this season from plants which have been forced, and the wood thoroughly ripened, produce fine plants for autumn-flowering and early spring forcing, supplying the want of flowers in the conservatory in winter and spring, the pots being prepared in the usual manner, and well supplied with drainage and other loose material; for one-third of its depth fill it up with a compost composed of equal parts turfy loam and silver sand well mixed, and sifted so as to keep back the large lumps. Select cuttings from strong short-jointed shoots three or four inches long, removing the lower leaves so as to leave the base of the cuttings clear; place them round the edge of the pot about an inch or an inch and a half deep. When planted, water freely to settle the soil round them, and place them in a cold pit or frame. Sprinkle them occasionally overhead till rooted; afterwards give air gradually to harden them for potting off into 3-inch pots.

1447. For autumn-flowering, the most desirable are the free-blooming and strong-growing kinds, as Lyne's Forget-me-not. Beck's Meteor, Negress, and Sultana are better adapted for spring forcing; and, among scarlets, General Ayres, the Queen, Royal Dwarf, and Compactum will stand the high temperature well.

1448. When well established in the small pots and about six inches high, stop them, that they may throw out lateral or side shoots. When they have made their shoots, re-pot them in 48's, in equal parts turfy loam, peat, and decomposed cow or stable dung, with a good proportion of road or river sand, the pots being thoroughly drained with potsherds or oyster-shells: thin out the leaves and small shoots occasionally, to throw the whole sap into the shoots which are to produce flowers. When plunged into the border to flower, these plants will be benefitted by being lifted occasionally to prevent them from rooting through the bottom of the pots. Those for spring forcing will require a further shift in September; and the fancy varieties, being more delicate growers, will require more drainage; and a little charred cow-dung in rough placed over the potsherds will be found beneficial.

1449. *Fancy Pelargoniums.*—When autumn-flowering plants are required, take cuttings in early summer, when they will strike freely; fill the pot half full of broken potsherds, and fill up with a compost of equal parts of good turfy loam, peat, and well-decomposed cow-dung and leaf-mould, with a good portion of silver sand. By the end of July the plants will require to be re-potted, taking care that this is repeated as often as roots fill the pots. As the season advances, a little heat will make them expand their blossoms more freely. For large fine-grown specimens select a strong plant, and pot in a compost consisting of two parts good turfy loam, one of leaf-mould, one of well-decomposed cow-dung, and a good portion of silver sand. After a summer's free growth, assisted by frequent watering, about the beginning of July begin to diminish the quantity of water, so that the wood may be thoroughly hardened before cutting down. By the end of July the plants should be shaken clean out of the soil, the roots pruned at the points, and re-potted in the same compost. The plants, being thoroughly established, should be re-potted in November, in pots of suitable size, in the same compost as before. In February they will require a second shift, when each shoot should be stopped at the fourth joint, to induce lateral shoots, tying each out horizontally. When the lateral shoots are of sufficient length, stop a second time. If intended to flower in May, stop after they are cut down in July if in June, stop in January; if in July, stop in February.

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§ 7.– FRUIT-CULTURE UNDER GLASS.

1450. *Vinery.*—Ripe grapes, if required to be kept, must be shaded during hot sun, to prevent their becoming shrivelled. The Cannon Hall, Muscat, Sweetwater, and Frontignans, having tender leaves, are most liable to burn, either from bad glass or imperfect ventilation; in which case they must be well watched, as the injury done to the foliage not only affects the present crop but the succeeding one as well. Any heat given now should be given during the day, in order to their getting well forward before the season gets too far on. Under this treatment they all keep longer and have a finer flower, keeping the outside borders of the late crops watered and well mulched.

1451. As the houses are cleared of their fruit and the wood is ripened, it will be much benefitted by having the lights off, and by being freely exposed to the atmosphere for a time. Air must be given in abundance by night as well as day, and the necessary stopping of lateral growths and thinning of the fruit in the last house proceeded with. Watch for mildew. Vines, in pots, intended to fruit next season, should now be well supplied with manure-water, to swell out and perfect their buds.

1452. *Peaches and Nectarines.*—Any tendency to the leaves decaying, when the fruit has been gathered, should be prevented by syringing and watering the roots. Fruit coming to maturity will be all the more delicious for a comparatively cool temperature while ripening. Examine daily and gather before it is over ripe. The great object now is to get the wood properly ripened; and that will be best promoted by a full exposure to the sun, the air, the rain, and the dews, by removing the sashes and top-lights.

1453. *Pinery.*—Still continue to supply fruit swelling with water, and syringe frequently, but not during bright sunshine, unless the shading is immediately put on. Young plants growing fast will require liberal waterings, in addition to air in large quantities by day: the temperature will allow them to have a good portion by night. During hot weather forced fruits of all descriptions will be benefitted by this practice.

1454. About the second week, the plants selected in the spring for autumn and winter fruiting will be showing fruit; and if they are in a pit by themselves, will require, if a steady bottom-heat is kept up, but little attention for some time, except slight shading, plenty of air, and a liberal allowance of water. On no account let the plants be wetted while in bloom. Some pines having large flowers, as the Jamaica, &c., frequently cut up with black spots in the middle, although apparently sound outside, which arises from a small quantity of water passing through the bloom to the fruit-cells, and causing the latter to decay.

1455. Let succession plants have abundance of air day and night, to encourage a stocky growth. Where it is intended to plant out the fruiting stock for next year, a sufficient quantity of loam, peat, and sand, should be in readiness for use. Directly the present crop is cut, the stump should be cleared out, and either all, or part of the soil, removed, according as it may appear exhausted.

1456. As soon as the principal part of the present crop is ripe, the pit will most likely be required either for fruiting the winter stock, or for the succession intended for next season's fruiting. Whatever fruit, therefore, may yet remain to ripen, should be carefully removed to one end of the pit, unless circumstances enable you to transfer them to a house devoted to fruiting the autumn and winter supply, in which case the house may be cleared whenever the principal part is cut. The bottom-heat must be freshened up by the addition of fresh material, and made ready for plunging the new stock of plants as they are placed in their fruiting-pots.

1457. In the mean time advantage should be taken of putting the house in repair, if requisite, and the heating apparatus in a state of efficiency, as no such favourable opportunity will occur again for a twelvemonth. Give air liberally to successions, and water freely when the pots become full of roots. Keep the bottom-heat steady. At this season the young staff may be potted whenever they require a shift.

1458. *Figs* swelling off their second crop should be assisted with liquid manure freely, more especially if growing in pots or tubs. As the fruit ripens, care must be taken to preserve them from damp, which the frequent syringing to keep down insects induces; it should, therefore, be a rule to look over and pick the ripe fruit every morning, and syringe directly afterwards: admit air freely, and pinch out the points of the young wood when grown sufficiently long. This will assist the swelling of the fruit, and produce useful spurs for bearing next year. It should be a rule to manage figs during the summer, that nothing further than a slight thinning-out should be wanted in the winter pruning.

1459. Proceed to pot strawberries for forcing: as soon as the pots in which the runners were layered become filled with roots, pot them in 6- or 7-inch pots, using rich loam of medium texture, and well-rotted dung, and drain well. The kinds intended for early forcing need not have quite such large pots as those intended for a later supply. When potted, place them in an open situation exposed to the sun, placing them on boards, or a prepared bottom, to prevent worms from getting to the roots.

1460. *Melons.*—Keep a steady bottom-heat and free ventilation, more especially in wet weather. Keep the strictest watch for red-spider and mildew; for both of which, sulphur, properly applied, is the best preventive, in addition to keeping the roots in action by a well-adjusted bottom-heat. Sow Lord Kenyon's, or any other good house cucumber, for autumn supply, following the same directions as for melons.

1461. *Orchard-House.*—Ventilation is now the greatest care; fasten back and front shutters down, so that they cannot be closed; syringing night and morning, and watering copiously when dry. If any trees are growing too rapidly, tilt up the pots, and cut off all the roots on that side which are making their way into the soil. A week later, serve the other side in the same way. If the surface is getting hard from watering, place some fresh compost loosely on the surface. Pinch in all lateral shoots to within two buds of their base. On the 10th and the 25th lift the pots in order to break off the roots.

1462. Remove all trees into the open air, to ripen their fruit in a sheltered sunny spot. This gives them a piquant and racy flavour, unknown to fruit gathered from wall-trees. Summer pinching of pyramids and bushes requires rigid attention.

1463. *Lighting Furnaces.*—For this purpose, the waste brushwood that is sure to accumulate in a garden is very suitable; it should be chopped while green, if possible, both because it chops easier, and because it is stowed away into a much smaller compass for drying; let it be chopped very small—scarcely three inches in length—for on this its chief efficacy, and the ease and comfort with which it is used, depend. In lighting furnace fires, the usual plan is to light the wood with straw; but this makes a deal of smoke, and clogs the flue; it is far better to use carpenters' shavings; but if these cannot be easily obtained, a good substitute is to have a piece of clean deal wood, and shave off a few chips with a knife, thrusting these under the wood, and applying the match, the fire is soon lighted without smoke; if the wood is cut very short, a small quantity will suffice; and when fairly alight put on a small shovelful of coal or coke. I find the most economical fuel to burn in places heated by flues, to be two parts breese, or the fine residue from coke (the ashes and cinder from a domestic fire are similar, and will answer the purpose), mixed with one-third coal. This gives a lasting heat, and may be banked up to keep in for a length of time. In cases of sharp frosts, the finer parts may be separated; it will then give a much stronger heat, but this will scarcely be required if the fires are lighted in time. Boiler fires should burn clear, so that dust will not do, and must be sifted out; but the same quantities make an excellent fuel for them.

§ 8.—Hotbed and Frame Cultivation.

1464. The purposes of hotbeds are limited at this time of the year, at least in most places. Cucumbers, melons, &c., are usually grown in houses and pits that are otherwise unoccupied at present; and as their culture is more cleanly, and with greater comfort that way, hotbeds may be dispensed with for a time; but those already in operation will require attention. The weather is usually hot this month and next, but is often changeable, and the manager of frames must be ruled by it. We sometimes have sudden and heavy showers, which would drench the plants and beds through if they were uncovered, probably to the destruction of the plants; yet plenty of fresh air is necessary; and the sudden changes produced by clouds obscuring the sun for a time, and then bursting forth hot and fierce, must be provided against: it is in such cases that a little shade may be advantageous; but it must be very slight, and not be left on a moment longer than is really required.

1465. Many gardeners make hotbeds at this time for propagating plants—as roses and greenhouse plants,—and also for other purposes connected with the flower-garden, &c. Hotbeds made in the ordinary way are very suitable, and have their advantages, and where the material is plentiful, they are probably the best; but a very useful bed for propagating and raising seeds, &c., is made as follows:—Having prepared the dung as usual, lay the foundation as for an ordinary bed, but commence from the bottom an opening which leaves the bed hollow, as shown in the margin; the sides and ends of the bed are narrowed at an angle from the bottom, which leaves the interior in the form seen in the section; drain-pipes are laid to conduct the heat from the linings into this hollow, which is covered by boards being laid across, on which the frame rests; the boards may then be covered with soil, ashes, tan, or dung, while the heat of the bed lasts; the pipes must be plugged up, but opened when lining is applied, to conduct the heat into the bed.

1466. *Cucumbers* in bearing should be copiously watered occasionally; if the soil shows any symptoms of dryness underneath, they should be moistened overhead every day; but this keeps the surface moist, while beneath it the soil may become dry. This being frequently the cause of plants going off, it should be guarded against by examining the soil before syringing. If the soil is not sufficiently moist, take care to water plentifully, as at this time of the year there is less danger of overwatering. If the weather is hot, and not too dry, the lights may be pulled quite off for an hour or two before 8 a.m. and after 5 p.m.; but see that the plants are not chilled before closing. Pickling cucumbers may be planted in the open ground at the beginning of this month; the soil should be well dug, and made pretty firm again, and well mulched after the plants are put in. Choose a warm sheltered spot for them, and place hand-glasses over them if they can be spared. Attend to former directions as regards stopping, pegging-down, &c., both for ridge and frame cucumbers. They will do on ridges put out at the beginning of this month.

1467. *Melons* planted at the beginning of this month may be put out in the ordinary manner in a common melon-pit, with a good body of dung; but, if planted later, it must be so that heat can be applied to ripen the fruit, which, occurring in the shortening days, will want assistance from artificial heat. Plants that are ripening their fruit must have very little water.

1468. *Capsicums*, &c., in fruiting condition, should remain in the pots, and be plunged in the bed; the roots will ramble through the pots, but are more likely to bear than if planted in the bed.

1469. *Mushroom-Beds.*—These may yet be made out of doors, providing plenty of clean straw and mats to protect them. Some gardeners make a practice of spawning melon-beds, either while the fruit is ripening, or after they are cleared off. It is done in this manner:—Clear off the old soil, break the spawn into small pieces, lay it regularly over the bed, and cover it with about two inches of horse-droppings, or very short dung. This, again, is covered with two or three inches of good loamy soil, and all trodden down and made firm. Heat is applied by means of fresh linings of well-worked dung.

1470. *Economical Flues.*—The first 10 feet should be brick in bed, the next 10 feet brick on edge; beyond that, earthen pipes may be used for any length, observing that the more length of flue the more heat is saved. For the necessary operation of cleaning the flues occasionally, bricks should be left out in places; and never remove a brick that is bedded in with the rest; in the pipe-flues place junction-lengths, at intervals of 8 or 10 feet, stopping the holes with slate and cement.

§ 9.—Window-Gardening.

1471. If it is desired to have a succession of window-plants in bloom, there must be a certain amount of potting, re-potting, and changing; as one goes out of bloom, another is brought in to take its place. By this means a freshness and gaiety may be kept up, and all the necessary work may be done in another place. At this time of the year, fuchsias, pelargoniums, and salvias, will be in perfection, and may take the seat of honour while they last; and as most of them are continuous bloomers, will probably last till October, when they may give place to chrysanthemums. Fuchsias, particularly, are adapted for window-culture, as they are very clean and, under good treatment, are little infested with insects. The same may be said of geraniums; many an old plant of which has had sole possession for years of the only place the owners had for growing them, *i.e.* the window. A scarlet geranium trained over the window-sash forms a verdant screen, the only objection to which is the leaves being naturally attracted to the light. Turn their backs to the interior of the room; nor is it advisable to turn them often; but if trained over a trellis fixed to the pot or box, the plant may be turned to the light in the daytime, and reversed at night. Many prefer having plants of dwarf or close habit, such as are easily kept within bounds. There are many kinds of beautifully-scented geraniums possessing this property, and will do well as permanent window-plants. The flowers of these are generally smaller than other kinds, but are mostly continuous bloomers during the summer and autumn, and at other times are well worth the room for their fragrance. It is merely necessary to stop them occasionally, by pinching out the points of long shoots, and picking off dead leaves. They will grow in almost any soil but two-thirds loam to one of leaf-mould and sand is generally used for them. They require plenty of water in the growing season, and a moderate supply at other times, giving them very little in damp or frosty weather.

1472. Other plants are suitable for a like purpose: among them must be named the numerous tribe of mesembryanthemums (a name not easily pronounced or spelt, and may give place to the old-fashioned one of fig marigold): these will grow for many years in the same soil, giving little trouble beyond watering. They are well suited for baskets or mounted pots, or vases, where they will hang down and look well. Many of them are very beautiful when in flower, comprising all shades of white, red, and yellow. They are what is termed succulent, having thick fleshy leaves; consequently will bear drought, and the heat of a room for any length of time, without injury; and as they require very little water in winter, one objection to their culture is removed: they grow well in sandy loam and leaf-mould, in which plenty of broken flowerpots, brick, or charcoal, are mixed.

1473. The various species of cacti are also very suitable as permanent window-plants: the varieties of creeping cereus may be grown in suspended baskets, and last for many years without requiring any change in the soil,—they naturally droop and hang down, which gives them an interesting appearance. The globular cacti are curious and interesting, and are very numerous, as every one must know who has seen the collection at Kew,—a collection of these would be worth a case to themselves. I have seen some interesting selections grown in small pots, and arranged on shelves fixed in a miniature greenhouse, 4 feet by 2 feet 6 inches, being all labelled. The smaller kinds of aloes may be grown in the same way: many of these are curiously and prettily marked, and those who fancy this sort of plant consider them quite as ornamental as flowers. They are all succulent, and may be treated in the same way as the fig marigold, giving plenty of water in hot weather, and little or none in winter, taking care that the soil is well drained.

1474. Fern-cases should be placed in the shade at this time of the year; if put where they can have light overhead, so much the better. If air can be admitted without dust, let the plants have it: when kept too close, they grow tall and spindling: they should not be allowed to touch the glass, since the condensed moisture rots and disfigures them, but less so when the case is properly ventilated: water rather freely in the latter case.

§ 10.—Small Greenhouses.

1475. Among the thousands of villas and neat gentlemanly cottages which surround all our large towns and cities many have their small greenhouse or conservatory, and trim little garden, back and front, capable of growing a concentrated selection of the most choice plants on a small scale. It may be that the garden has to be planted with half-hardy plants. The greenhouse, however small it may be, then comes in very useful for keeping a supply both for the garden in summer and the window and rooms during winter. A stock of geraniums, verbenas, petunias, lobelias, are struck in the months of July and August, and stored away for planting out the following season. After this is accomplished, a small collection of fuchsias will make the house lively; and as these are very easily cultivated, and may be stowed under the stage during the winter, till the house is emptied in May, nothing is better for the purpose. The following sorts would give satisfaction:—

Dark.

Elegans.
Catherine Hayes.
Autocrat.
Little Bo-peep.
Orlando.
Excellent.
Tristram Shandy.
Crinoline.
Big Ben.
Sir Colin Campbell.

Light.

Queen of Hanover.
Schiller.
Fairest of the Fair.
Duchess of Lancaster.
Fair Oriana.
Clio.
England's Glory.
Madame Sontag.
Princess of Prussia.
Madame Corneilison.
Mrs. Stury.

1476. The three last have white corollæ, with red sepals, and make a pretty variety.

1477. If it is desired merely to maintain a succession of plants in bloom during the year, it is advisable to select plants for the time in which they flower. Thus half a dozen azaleas, which flower in May; pelargoniums flower in June; fuchsias flower the three following months; then a few chrysanthemums, followed by Primula sinensis and heaths. A few dozen of bulbs will present a succession of flowers till May. By this simple process, which is easily managed, a continuous show of flowers can be obtained. Good plants for a small collection are—

Azaleas,—Indica alba, Model triumphans, Variegata, Halfurdiana.
Camellias,—Old white, Dunklaarii, Chandleri, Imbricata, Genista racemosa, Alliance.
Acacia lophantha, Armata, Rotundifolia, Virgata.
Erica Bowieana, Cosma rubra, Gracilis, Hyemalis, Pulchella, Wilmorii.
Epacris odorata alba, Hyacinthiflora, Impressa, and several other varieties.
Myrtus communis tenerifolia.
Plumbago capensis.
Helichrysum proliferum.
Abutilon striatum, Venosum.
Veronica Lindleyana.
Coronilla pentaphylla.
Deutzia gracilis.
Daphne japonica.
Diosma ambigua, Speciosa, Ericoides.
Pimelea Hendersoni, Decussata.
Solanum crispum, Capricastrum.
Witrienia corymbosa.
Linum trigynum.
Metrosideros floribunda.
Clianthus magnificus.
Corræa bicolor.

1478. A selection from such as these will give satisfaction. A few geraniums might be added; as—

Alba multiflora.
Gem of the West.
Madame Corbay.
Crimson King.
Multiflorum.
Viola.
Unique.
Primula sinensis.
Cinerarias.

1479. Calceolarias of the herbaceous kinds are well worth cultivating, and where grown in a small way, had best be sown in July, covering the seed-pots or pans with a piece of glass, and placing them in the shade. A few bulbous-rooted plants would be found very useful.—Lilium album, punctatum, and rubrum; Oxalis tubiflora variabilis, Rosea-flava, Ixia aurantica, Lachenalia tricolor, Cyclamen coum, Persicum, Europæum, are all very attractive in their season, giving them a season of dry rest soon after the bloom is over.

1480. A few useful chrysanthemums for autumn-flowering might be named:—

Plutus.
Racine.
Alfred Salter.
Madame Lebois.
Mrs. Holborn.
Prince Albert.
Madame Camerson.
Annie Salter, &c.

1481. These are large. A few good pompones are—

Andromeda.
Cedo nulli.
General Canrobert.
St. Thais.
Duruplet
Adonis.
La Rousse.
Solomon.
Dr. Bois Duval.
Drin-drin.
Bob.
Mrs. Dix, &c.

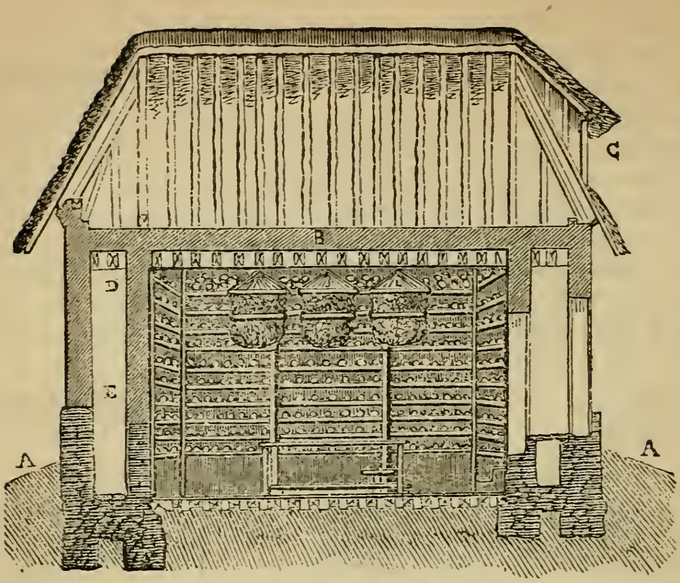
1482. These may be struck any time from November to June, or even later, and may be had of all sizes. A few useful climbers for a small greenhouse:—

Passiflora cærulea.
Ecremocarpus scaber.
Hibbertia volubilis.
Solanum jasminoides.

Maurandia Barclayana might be trained up the back or pillars. It is necessary to make a proper bed or border of earth for them to grow in.

1483. Plant-culture is not the only purpose to which a small greenhouse may be put: the practice is not uncommon to grow fruit in them. For this purpose, small fruit-trees are grown in pots: the roots being confined, they are not liable to run to wood; but keep within certain bounds for the more certain production of flowers and fruit. Any one who can cultivate flowering-plants may grow fruit-trees in pots; the only points being to keep them well supplied with water while in a growing state, and ripen off the wood well in the autumn. A long list of fruit-trees suitable for the purpose might be named; but the following may serve as a guide. They are usually worked on quince or paradise stocks, which, in a great measure, serves to keep them within proper limits as to size:—

Apples.—Braddick's Nonpareil, Cellini, Golden Pippin, Orange Pippin, Newtown Pippin.
Pears.—Beaurré, Hardy, Marie-Louise, Bon Chrétien, Winter Nelis.
Plums.—Victoria, Green-gage, Purple-gage, Topaz.
Cherries.—Bigarreau, Elton, May-duke, Morello.
Peaches.—Noblesse, Royal George, Crawfurd's Early.
Nectarines.—Impératrice, Newington Early, Stanwick.



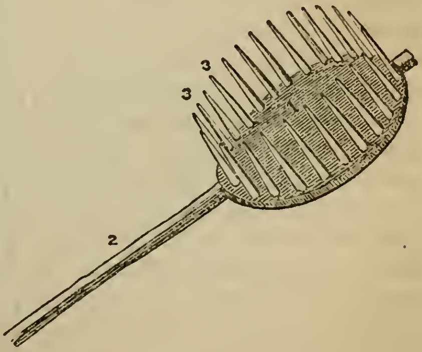
SECTION OF FRUIT-HOUSE.

CHAPTER XXVII.

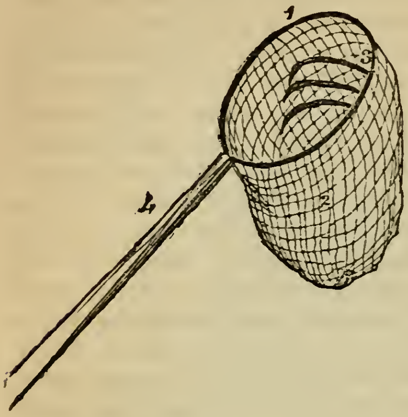
ON GATHERING AND STORING FRUIT.

1484. FRUIT-GATHERING is one of the most cheerful and agreeable employments connected with garden management. It usually enlists every hand in its service, and in an abundant year finds all hands plenty to do. To the following plain and simple directions, those who are intrusted with the superintendence of fruit-gathering will do well at all times to attend. It is important, in the first place, to remark, that no fruit should be gathered for storing before it has arrived at maturity. By this we are to understand not necessarily its full flavour and ripeness, but the completion of its growth or size; and as all fruit even upon the same tree does not come to maturity at the same period, it will frequently be found the safest and most economical plan to make the gathering at two or three different times. It is very easy to ascertain when any particular fruit is ready.; for ripe fruit always leaves the tree upon a gentle touch,—the fruit-stalk parts from the twig on which it grows without any signs of rending or violence. In a general way, with both apples and pears, several of the most forward fruit will have fallen before the general crop is in a fit state to be gathered; and this fallen or bruised fruit should never be mixed with that which is intended to be stored; all unsound fruit which may be found upon the trees at the time of gathering should also be rejected. Fruits, in fact, which ripen in summer and autumn, should be gathered a little before they are absolutely ripe: thus gathered, they are better in quality and higher flavoured than when absolutely ripe. But this must not be carried too far. A single day before they are perfectly ripe suffices for peaches and other delicate stone fruit; a week for apples and pears; and cherries are only gathered when completely ripe. Apples and pears, which arrive at complete maturity in winter, are best gathered at the moment when the leaves begin to fall, and the sap to withdraw from the branches in October. All gathering should take place in dry weather, and the fruit should not be handled or pulled about more than is absolutely necessary. The middle and afternoon of the day will usually be found the best time for gathering, as autumn mornings, even in the finest weather, are always more or less humid; and to avoid any risk in keeping, all fruit should be quite dry before it is taken from the tree. The most convenient baskets for fruit-gathering are peck and half-bushel baskets, with cross-handles. These should be provided with a line and a hook, by means of which they may be hung to the branches of the tree, and thus allow the gatherer the liberty of using both his hands: by the line, the baskets, when full of fruit, can be lowered to be emptied, and drawn up again. Several little contrivances have at different times been introduced to the public, in order to assist the fruit-gatherer; but these, as far as they have come under our own observation, are more remarkable for their neatness and ingenuity than for their general usefulness. Undoubtedly, the human hand is the best and safest of all fruit-gatherers; but when bunches of fruit grow at the extremities of slender branches quite out of reach, as is not unfrequently the case, some additional assistance appears requisite even when steps and light ladders are at hand. The little rack or cradle, represented in the following sketch, is much used on the Continent, and might, with advantage, be introduced among ourselves:—

1485. It is constructed thus:—1 is an oval piece of board; 2, a handle of any convenient length, to which the board is firmly fixed; 3 3, wooden pegs fixed in the oval frame. These pegs are about five or six inches long, and one and half or two inches apart,—just wide enough, indeed, to allow the fruit-bearing twigs freely to pass through them. The application, of course, is obvious. The teeth act as a comb, and at the same time form a receptacle, by means of which the fruit may be safely conveyed to the basket; for, the rack being drawn over the twigs with the teeth upwards, the fruit is readily gathered into it. Another very simple, useful, and inexpensive fruit-gatherer may be made as follows:—



1486. 1 is a hoop of light iron rod; 2, a net-bag appended to it, after the manner of a landing-net; 3, three teeth set with a curve just a little higher than the hoop. These teeth may be made of the same wire as the hoop; but they should be covered with cloth or some soft material to prevent bruising the fruit; 4 is a wooden shaft or handle, which may be extended to any length, after the manner of a fishing-rod. In this case it is desirable that the teeth should be set at such an angle with the rim, and the rim at such an angle with the shaft, as to insure the fruit falling into the net. This, of course, though very easy of adjustment, cannot well be represented on paper. It would be well if the joint between the shaft and the rim could be made movable. With such an instrument, having a jointed shaft as described, fruit may be safely and expeditiously gathered from the ground off the very points of the outside branches, which otherwise are very difficult to be got at, and where, not unfrequently, the finest fruit is to be found.



1487. With regard to the choicer sorts of pears, especially those growing on trees against walls, or on dwarf-trees, it will well repay the little extra time and trouble it may cause to gather these by their stalks without touching them with the hand, and to remove them at once to the fruit-room on the trays or in the drawers in which they are to be stored. There is on the skin of all fruit a secretion more or less marked, known commonly by the name of bloom. This, though less conspicuous on apples and pears than on plums and peaches, is nevertheless present, and its use is to protect the skin of the fruit from the ill effects of excessive moisture. While this bloom can be preserved, the fruit will never require wiping, and will retain its full flavour and freshness. The season of fruit-gathering must be considered to be the most important in the year. All other seasons are to be regarded as preparatory to this, which is to reward the cultivator for his past care and labour. Five or six weeks in autumn,—earlier or later according to the season, and according to situation also, are usually given to the gathering, collecting, and storing of the different varieties of apples and pears, which, in our country, are known as autumn fruits. In a commercial point of view, the result of this season has a most important bearing. The difference between a good and bad apple and pear crop is to be measured by many thousands of pounds; and what household is there, whether among rich or poor, which knows not the luxury of an abundant autumn, and the inconvenience—to say nothing of the pecuniary loss—when some of the many accidents to which our fruit-trees are liable, have deprived us of our utumn crops, or left us only a poor and indifferent supply for our winter wants? In some parts of the country, this loss, when it occurs, falls with far greater severity than in others. In most of the southern and western counties of England, cider is not only made for the consumption of the rest of the kingdom, but forms the chief drink of the labouring classes; and the quantity of apples consumed in its manufacture is something enormous. In Devonshire and Herefordshire the cider orchards are on a very extensive scale; and in these, and some other counties, a bad apple crop causes even far greater pecuniary loss than a deficient wheat crop in other neighbourhoods. The process of fruit-gathering for cider purposes is, for the most part, carried on in a very rude, and, we should consider, in a very wasteful manner. It is called "poulting," and consists in striking the different branches of the trees with a long pole to shake off the fruit, which is then gathered up from the ground. It can hardly be a matter of doubt that a more careful method would be less injurious to the trees, and thus, in the long run, be far more profitable to the grower.

1488. From these remarks upon the gathering of fruit, we come next to the storing and preservation of it,—a most important part of the subject; for nature's all-bountiful goodness may be lost to us, and all the care and all the toil of the most skilful cultivator thrown away, if some good and efficient plan be not adopted to preserve the fruit after it has ripened and been gathered in. Our observations, of course, must still be regarded as confined to apples and pears,—those two staple fruits which, as we before remarked, are the only winter supply of our own growth, with the exception of nuts; and of these it will be more convenient to treat by-and-by.

1489. Taking it for granted, then, that the gathering of apples and pears is well over, and the time for storing come, how can these two most valuable products be best preserved? It would be easy to place upon paper our own theory, and to show that in a particular neighbourhood, and where expense is no object, one plan of preservation has a decided preference over all others; but writing, as we do, for the general information of those who live in a country so variable in climate and in soil as our own, it is not possible to affirm that, for general adoption, any one plan is abstractedly the best; for there must undoubtedly be a considerable modification of treatment between fruit grown upon a wet soil and in a humid atmosphere and that grown upon a light dry soil where the atmosphere is less moist. Again, all persons are not in a condition to construct a fruit-room, and to manage the preservation or winter-storing of fruit in the manner even best suited to their own neighbourhood; but they must make use of any spare chamber which they may happen to have for a store-room, and be content with the arrangements of which it will admit; so that, after all that may be said or written upon this subject, it is obvious that much must remain for experience to teach or suggest. While describing the sort of fruit-house, therefore, which so experienced a fruitist as M. Du Breuil recommends, and pointing out the general principles which ought to regulate all attempts at the preservation of fruit, and enumerating the various plans which are in use for this purpose, we shall leave it to the experience of the cultivator to adapt these principles to his own circumstances. There cannot be the slightest doubt upon the subject, that all changes of temperature have the most powerful influence in causing the decay of fruit after it has been gathered and laid up. Whatever, then, tends in any degree to correct or modify these changes is a condition favourable to the preservation of it. It is for this reason that all substances that are slow conductors of caloric are preferable to all others for the purpose of covering or packing fruit; and for the same reason darkness is more favourable to fruit-keeping than light; for uniform darkness is less susceptible of atmospheric change than the continued variations of light and shade. It is certain, also, that far less evaporation goes on in darkness than in light; and this is another reason why all fruit is found to keep best in a dark place. It is worthy of observation, that nature has imparted to some species of fruit conditions of self-preservation which it has withheld from others. Thick-skinned fruits, both in apples and pears, as the different classes of russets among the former will amply testify, are not so liable to a condensation of moisture on the surface as the more smooth and glossy varieties. A thick woolly skin not only affords protection from injurious influences from without, but, under all circumstances, it tends to preserve a greater uniformity between the state of the temperature of the atmosphere and the temperature of the natural juices of the apples and pears than can possibly exist where the skin is finer and more transparent. The bloom of the fruit, as was elsewhere observed, serves somewhat to the same end. Not unfrequently a process is adopted by means of which, as soon as the fruit is gathered, a certain portion of its natural juices is, as it were, drawn off, and its susceptibility of atmospheric changes proportionately lessened. This process, which is generally known by the name of "sweating," consists in throwing the different sorts of apples and pears together in heaps as soon as they are gathered, covering them close with straw or old carpets, in order to promote fermentation. When this has been continued for two or three days, they are then uncovered and wiped individually, all unsound fruit being rejected and the good removed to the store-room. There is no doubt that apples and pears, especially when grown upon a heavy damp soil, and in a moist atmosphere, keep well after this treatment, for the reason already assigned, that they are less susceptible of atmospheric change: but it will always be found that the process has been adopted at too great an expense; for the quality and flavour of the fruit have been more or less destroyed by it. Any one may prove this for himself by a repetition of the process. Alternate sweating and wiping will, after a time, leave a heap even of the finest and best-flavoured fruit nothing better than a mass of vapid and insipid pulp.

1490. The following statement appears to embrace the best methods, and those that are most generally adopted for the storing and preservation of fruit. It must be borne in mind that they are not arranged in order with any reference to their respective merits: some of them are decidedly objectionable; but the good and bad of each will be noticed as we proceed:—

1. Apples and pears may be sweated as above described, and then stored away in an apple-room on dressers, or in a dry dark vault in heaps, uncovered except during frost.

1491. This plan, though very generally adopted where apples are kept in large quantities for sale, is always open to the objection above stated of being more or less injurious to the quality and flavour of the fruit.

2. Fruit may be stored on open shelves and on the floor of a fruit-room, spread out upon straw, and covered, when necessary, with the same material.
3. In the same way, but upon dried fern-leaves, and with fern-leaves for a covering.

1492. In our opinion it is by no means a good plan to store apples and pears upon straw, nor even to cover them with it; for straw always imparts an unpleasant flavour to the fruit. Fern-leaves, when properly dried, form an excellent bed for fruit to lie upon, and are not liable to the same objection. As a protection against frost, fern-leaves are decidedly a good covering.

4. In baskets or hampers, lined with straw or fern-leaves, but without any material between the layers of fruit.

1493. If the fruit be dry when placed in the baskets or hampers, and the store-room of an even temperature, it keeps very well in this manner. However, for the reason assigned above, fern-leaves are preferable to straw.

5. In boxes or casks, with sawdust.
6. In boxes or casks, with bran.
7. In boxes or casks, with wheat-chaff, or with oat-flights.

1494. Sawdust is decidedly objectionable, even though taken from the hardest and most inodorous wood, for it is almost certain, after long keeping, to become musty and unpleasant; and so also does bran, which is naturally a fermenting substance, and soon heats if put together in any quantity, especially with fruit among it. In shallow trays, bran will answer for a time very well, but it will require attention. For packing fruit for conveyance, both bran and sawdust also may be used with good effect. Wheat-chaff, as well as oat-flights, is liable to produce the same mischief. It is quite impossible to be certain that the fruit will not become tainted by means of them, more particularly in closed boxes, and wherever there is no ventilation.

8. In boxes, with dry sand between the fruit.
9. In boxes, with powdered charcoal in the same way.

1495. By adopting either of these methods, fruit may be preserved for a long period; but though sand and charcoal are good materials for keeping fruit sound, they are both open to the great objection of making the skin gritty and unpleasant.

10. In jars without any material intervening between the first: the jars, when covered with a piece of slate or tile, to be buried in dry sand of a depth sufficient to exclude all air and to insure preservation from frost.

1496. This plan will, undoubtedly, answer its purpose as far as preservation in concerned; but it is attended with much greater trouble and inconvenience than most persons would deem desirable.

11. In deep drawers one upon another, without any substance between them.
12. In deep drawers, with sheets of paper or dried fern-leaves placed between the layers of fruit.

1497. Both these plans are good, and if the fruit be stored sound and dry, there will be little need of any intervening material.

13. In single layers in shallow trays or drawers resting upon fern-leaves, and to be covered when necessary with the same.

1498. This is the plan which we should recommend as the safest and best under ordinary circumstances, to be adopted; and upon it we shall have to enter more into detail when we come to speak of the construction of a fruit-room.

14. In heaps in dark, dry, well-aired vaults. In this way both apples and pears, in large quantities, may be well and easily kept; and if the vaults be thoroughly dry and sufficiently beneath the surface to exclude frost, the fruit will require no further protection, and give but little trouble.

1499. Other methods might be added to these, but on careful consideration they will generally be found to assimilate themselves to some one or other of the fourteen already enumerated, differing for the most part only in the material used for packing or covering, which in every case will be found to be good or bad, according as it conforms to or violates those general principles which we have already pointed out as essential to the preservation of fruit. Before we leave this part of our subject, it may be well to remark that most of the different varieties of pears stored for winter use may be brought forward for the table some days earlier than their usual period of ripening by being kept in a warm situation. In times of scarcity, when, as is often the case, there happens to be a tolerable crop of any one particular pear which will thus be required to last over as long a period of time as possible, it will be found very useful to adopt this plan with part of the fruit, so as to extend the time of the ripening of the crop. A drawer in a warm dry kitchen may be made use of for the purpose. No pear, it may be observed, is fit for table until it has arrived at such a state of ripeness that it feels soft when gently pressed with the thumb close to the stalk. This is, perhaps, the best way of ascertaining the ripeness of any fruit, as less injury is likely to arise from pressure near the stalk than in any other part. In certain seasons some sorts of pears are found to be very difficult to ripen. This is especially the case with those which, from the absence of sunshine, want of vigour in the trees, or other causes, have not arrived at maturity at the time of gathering. It must not be considered, however, that such hard fruit is altogether useless. It may be made into an excellent preserve simply by baking the pears in jars well covered down, without sugar and without water. The jars should remain in a cool oven all night, or longer if found necessary.

1500. With most persons the fruit-room is the great difficulty in the way of preparation for the keeping of fruit. They cannot follow out the plan which they themselves think best, because the chamber which they are obliged to make use of for a store-room does not admit of the necessary arrangements being made in it. A loft over the coach-house or stable, a spare room in the gardener's cottage, or what is even more generally the case, a top attic in the dwelling-house, is often converted into a fruit-room; not because it is well adapted for the purpose, but because it is the only place that can be spared. It was for this reason, among others, that we deemed it advisable to enumerate many of the different plans which are made use of for the preservation of fruit, so that each one might adopt that which the circumstances of his case admitted, rather than to attempt to determine what plan is abstractedly the best. Where, however, no such restrictions exist, and a fruit-room can be constructed and arranged in the manner most likely to accomplish the object desired, the following provisions should be carefully attended to:—

1501. If the place to be built for a fruit-room be above ground, and not a dark, dry, well-aired vault, as recommended (1489), a north aspect must be elected; and if the room be on the top story, the roof of it should slope towards the north. The best possible covering for a fruit-room is thatch; but if this cannot be managed, or from any cause is deemed objectionable, let the roof be double: also, the outer walls of the room should be hollow; for, with a double roof and hollow walls, the liability to injury from frost will be considerably diminished. Though the fruit-room should for the most part be kept dark, it is desirable that there should be one or two small windows in it, and some good and simple method of ventilation, so that on dry days, and whenever necessary, the atmosphere may be completely changed.

1502. This is most important; for though it is not desirable to admit air unless needed, ventilation must never be neglected when the exhalations from the fruit have in any degree tainted the air of the room. Whenever there is a strong smell in the fruit-room, we may be quite sure that something is wrong. Let us suppose, then, a fruit-room so situated as described, with a north aspect, properly roofed and ventilated, and of convenient dimensions for the size of the garden. We will say, that in shape it is a parallelogram, with its door or entrance in one of the shorter sides. A very important question now occurs. How can such a place be best and most conveniently fitted up? The centre should be occupied by a dresser running lengthways to the extreme end of the room. This will be useful for resting or landing the baskets of fruit, as soon as they are brought in from the orchard or garden. The underneath part of the dresser should be fitted up with drawers on one or both sides, according to the width of it; and the top provided with a ledge about two inches deep on all sides, to prevent any fruit that may be laid upon it from falling off. The depth of the drawers may vary according to circumstances,—some may be deep for storing very dry fruit, one upon another, as in Nos. 1486 and 1487; others shallow for fruit in single layers, as recommended in No. 1488. The sides of the room also may be fitted up in the same manner, with dressers all round and drawers underneath. Over these dressers the side-walls may be filled with shelves of any convenient width, about nine inches or a foot apart from each other, according to the width of the shelves. These shelves must, in the same way as the dresser, be fitted with a ledge one or two inches deep to prevent the fruit rolling off; and in severe frosty weather the apples and pears on the shelves may be covered with fern-leaves, as recommended in No. 1478. D.

1503. To the judicious remarks of our correspondent D. it may not be out of place if we add the following directions, chiefly taken from M. Du Breuil, who also tells us, after examining the various expedients for gathering the fruit, that, wherever practicable, it is best gathered by the hand, but without any pressure; all other processes damaging the fruit, and that it is best to adhere, even for the loftier branches, to the ladder.

1504. As the fruit is detached, it should be disposed in a large basket, not very deep, at the bottom of which a layer of soft moss, or dry leaves, is laid; and not more than three layers of fruit should occupy the same basket, each layer being separated by a bed of leaves, and the basket, when full, placed under cover. The dangers to be guarded against, and object to be gained, are, for the first—

1. Protection from frost, which leads immediately to decay. For the second—
2. Matured ripening, which is to be effected so slowly, that some sorts shall only be in perfection by the month of May.

1505. The success of this process depends, in some degree, on the kind of fruit-house in which the maturing process is carried on; and a perfect *fruitery*, according to M. Du Breuil, should have—

1. A temperature always equal, of from 8° to 10° of Reaumur, or 40° to 42° Fahrenheit, and dry rather than moist.
2. Complete seclusion from light.
3. No communication with the external atmosphere.
4. A disposition of the fruit which shall avoid contact with each other, or, at least, prevent pressure.
5. A northern aspect, with a perfectly dry foundation.

1506. The house M. Du Breuil recommends, varying in size according to the fruit to be stored, presents an inside length of 16 feet by 13 feet, and 16 feet in height. This house, he tells us, will contain 8,000 apples or pears: the floor is raised 30 inches above the soil when it is very dry; where the subsoil is moist, it should be nine or ten inches higher. This disposition renders the exclusion of moisture more simple: to this must be added thorough drainage, with a slope to the drains all round.

1507. The fruitery is surrounded by two walls, leaving between them a space of 20 inches or thereabouts, as represented in the section of the room at the head of this chapter. This bed of air interposed between the two walls intercepts the external air. The two walls, each about 15 inches thick, are constructed in frame, of a sort of mortar made of a mixture of argillaceous earth and marl, mixed with straw, which is preferable to ordinary brickwork, both because of its being a worse conductor of heat, and being much cheaper where clay is at hand, the double foundation being formed of rubble-work.

1508. These walls are pierced with six apertures about two feet from the ground, three in the external, and three in the inner walls; these openings in the external walls, one at each side, and one in front, opening from without; those of the internal walls, which are opposite to them, opening within, being in two halves.

1509. In frosty weather these openings are closed with straw packed between the openings. The opening in front is the entrance which ascends by two steps to the second door, raised 20 inches above the soil. When the fruit is about to be stored, it is a good practice to paper up all the joints through which the air may penetrate.

1510. The ceiling B is composed of a bed of moss between laths. This ceiling is surmounted by a roof of straw or haum, at least two feet thick. In this roof the dormer window C permits of the loft being turned to use. The flooring may be boarded, or of asphalt: the walls should have a thin lining of deal, up to the ceiling, every precaution being taken to exclude the external air, and, above all, moisture.

1511. A row of shelving commencing about two feet from the floor, runs up to the ceiling, the shelves being about 12 inches apart, and about 30 inches wide. These shelves are formed of deal, with ledges of half-inch stuff fixed on them to keep the fruit in its place. In order to be able to see the whole fruit on each shelf at a glance, they are placed at an angle of 45°, the angle gradually decreasing until it reaches below the level of the eye, when the shelves are placed horizontally. In order that the air may circulate freely between the shelves and the wall, a space is left behind each of the slips disposed in gradients. As to those placed horizontally, the same end is attained by fillets half an inch thick, and sufficiently apart for the purpose. Those several shelves fixed against the wainscoting by brackets, are sustained in front by posts placed five feet apart, with cross-rails placed at proper angles to support the shelves.

1512. In the centre of the house is a table 10 feet long and 40 inches broad, with a clear space all round: above this table are shelves, with edgings like the side-shelves, to receive the fruit for storing; and under the table are drawers for the most choice fruit.

1513. As the fruits arrive, they are disposed on the table, which is spread with dry moss; each sort of fruit being separately placed, the spotted or bruised fruit being carefully separated. During the next two or three days, the sound fruits are exposed here until they lose their superfluous moisture. After these few days they are spread upon their shelves, each shelf being previously covered with dry moss or cotton, and the fruit carefully wiped with a soft flannel (an operation of very doubtful utility, inasmuch as it destroys the bloom), ranging them so that each fruit is separated from the other. The fruit all disposed of, the doors are left open during fine days. In about eight days of exposure in fine weather, the superfluous moisture will have disappeared: after this close and hermetically seal all the openings; even the doors should be closed, except when it is necessary to enter.

1514. Hitherto we have only spoken of drying up the moisture by the atmospheric currents, which in damp weather presents serious difficulty in curing the fruit: it being found impossible to exclude altogether the external moisture, which is most injurious to it. In such circumstances, chloride of calcium may be employed with great advantage. This salt, which is moderate in cost, has the property of absorbing about double its own weight of moisture when exposed to the atmosphere. Introduced into the fruit-house in sufficient quantity, this salt absorbs the humidity given out by the fruit, and maintains the atmosphere in a state of sufficient dryness. Chalk has also the quality of absorbing moisture; but much larger quantities are required.

1515. In employing chloride of calcium a sort of box is prepared, lined with lead, about 20 inches by 30, and some half an inch deep, and sloping to a corner which has an opening. This box is placed on a table slightly inclined, with a jar immediately under the opening. Into this corner the water collected drains when it has accumulated in sufficient quantities by the attractive powers of the calcium. If preserved in jars, the calcium may be made fit for use again by placing the liquid in a flat pan, and evaporating the water over a slow fire until the salt is again perfectly dry. The residue is still chloride of calcium, which may be employed over and over again with the same result.

1516. The fruit-room at Dalkeith Palace, which is nearly the same as that at Chiswick, Mr. McIntosh describes as "having hollow walls to resist the external damp, heat, and cold. Ventilation is carried on by an opening in the ceiling; damp or foul air escaping through boxes, issuing at the top of the walls. Both ends of this ventilating-tube can be shut when necessary by letting down flap-lids, to which lines and pulleys are attached. The ceilings are triple-coated with plaster, and deadened with nogging above. The slates are laid in mortar, and double-thick lining is laid under them, tongued and grooved. Thin canvas curtains hung on rollers are let down in front of the shelves to exclude air and light when it is necessary to open the door. The fruit is laid on the side-shelves on both sides, and a central table serves for sorting. Drawers under this table are appropriated to the more choice apples and pears. The shelves themselves are open trellis-work, on which the fruit is laid."

1517. Many of our readers have, no doubt, been struck with the fine appearance and rich flavour of the Newtown pippins and other apples and pears which now reach this country annually from Canada and North America. Much of their fine quality is owing to the manner in which the fruit is gathered and preserved. We believe we are correct in giving the following as the process of preservation which it undergoes:—As the fruit-gathering season approaches, tin canisters of a proper size are prepared and carefully soldered; the usual size being seven inches in height by five in diameter.

"Select the finest fruit,—peaches, strawberries, pears, apples,—what you please," says a writer in the *American Horticulturalist.* "It should be just ripe, but not beyond that stage, and perfectly free from bruises. Fill the canisters, place the tin lids in their places, and solder them down, leaving only a small hole the size of a pin in the centre of the lid for the escape of air. The next point is to drive all air out of the canister. In order to do this, take a broad flat-bottomed boiler pan, place the canisters in it, and fill the boiler with water to within about three-fourths of an inch of the tops of the canisters; place the boiler over a gentle fire until the water boils. This will drive all the air from each canister; but to make sure that it is all expelled, when the temperature of the water in the boiler is about 200° Fahr., let a drop of water fall on the hole: when the bubbles of air cease to rise through the water thus dropped, the air is all expelled. You may now pass a dry cloth over the top, and solder them by letting a drop of solder fall on each. This seals the canister hermetically, provided it has been properly made, and the fruit will remain perfectly unchanged for years. The immersion of the canisters in boiling water does not impart the slightest taste of having been cooked to the fruit; but the canisters should be left to cool gradually in a dry place."

1518. We should have some fears that the flavour of fruit so preserved would be materially changed, in spite of the writer's assurance. It is probably too expensive a process also, except for the more delicate fruits. We believe the apples and pears which reach us from America come in casks, in which layers of cork sawdust alternate with layers of fruit, which has previously undergone a drying process by exposure in a dry and shaded room.

1519. In respect to peaches, apricots, and nectarines, we need not tell our readers that their handling must be of the most delicate nature. As the fruit approaches the ripe state, nets or mats suspended on short stakes should be suspended beneath the fruit, each having a lining of dry moss or lawn-grass, not to supersede hand-picking, but to guard against accidental falling. When a gathering is to take place, a shallow basket should be selected, covered with a layer of moss or leaves, and each fruit as it is removed from the tree should be deposited in it, separated from those already in the basket by a leaf placed under it, and covered with another, to protect it from contact with the next.

1520. With such delicate fruit as the peach and its congeners, no mode of preservation for winter use will be effective, unless it be the American process which we have given in detail; but even packing it for short journeys requires much care. Let us recommend for this purpose a box sufficiently deep to hold two tiers of fruit, and no more, and pack these with the following precautions:—The box being ready, and a quantity of well-beaten and dry moss, or dried lawn-grass in the absence of moss, being provided, wrap each fruit, with the bloom untouched, in a piece of tissue or other equally soft paper, and pack them pretty closely with moss until the first layer is completed, and make it perfectly level by filling up with moss, placing an inner lid over the tier; make a second layer in the same manner, and put on the lid in such a way that the fruit, without being exposed to pressure, will remain steadily in its place.

1521. Filberts and walnuts to be stored for winter use, should be gathered when full ripe, and on a dry day. The latter must be cleared of their husks. They may then be packed in glazed earthen jars, tied down with coarse brown paper, and kept in a damp cellar. Filberts keep best in this manner without their husks; but if the husks are to be preserved, the fruit must be left to stand for a night in open baskets, and be well shaken to get rid of earwigs. Many persons shake a little salt over the last layer of nuts before the jars are tied down.

1522. All drawers, shelves, boxes, or jars containing fruit, should be labelled every year as soon as the fruit is stored, so that the different sorts may be easily and readily known.

§ 2.—ROOTS AND VEGETABLES.

1523. There are several processes, most of them of French origin, by which vegetables of the more delicate varieties, as French beans, green peas, and cauliflower, may be preserved in their green state, and be nearly as fresh as when first gathered. In the *Revue Horticole*, the following is given as the method employed by M. Gohen, of Montigny, for preserving French beans in a fresh and green state, so as to keep sweet till the following season, when new crops are fit for gathering. The beans for the purpose are gathered in dry weather, and after the dews of the night have been evaporated. They are plunged into boiling water, taken out again immediately, and allowed to stand till they are cool, when they are put into a small cask, a layer of vine-leaves being placed at the bottom; over this is laid a layer of beans six inches thick, then another thin layer of vine-leaves and then beans; and so on alternately, until the cask is nearly full, when the whole are covered with a layer of vine-leaves. A board is now fitted to the cask, neatly fitting into it, and a weight placed over it, sufficient to press the contents of the cask into a compact mass. When the pressure has been on it some few hours, a sufficient quantity of salt and water should be poured over it to saturate the whole mass freely, and the board and weight replaced. As the salt and water evaporate, it should be replenished from time to time, to keep the whole contents of the cask moist, taking care that the board is always replaced immediately after portions of the vegetable have been removed for use.

1524. Potatoes, except those reserved for immediate use, do best when harvested in clumps in the open ground, care being taken to protect them from rain and frost. For this purpose a long ridge is the best form. The ground should be dry and thoroughly drained, and if there is any doubt of its being dry, the surface should be removed, leaving it sloping to the centre; some gravelly soil laid down for drainage, and some light earth over it; a row of drain-tiles running down the hollow to carry off all moisture. Over this the potatoes should be heaped on a ridge, tapering from a base of three feet to a foot and a half, or less, at the top, separating the different sorts by divisions in the ridge. It is usual to cover this ridge with a thatch of wheat-straw, and over that with six or eight inches of mould; but some authorities highly disapprove of this being done. McIntosh recommends the tubers being covered with turf, and afterwards with soil, as more expedient; and in the absence of these, laying on the soil at once without any litter; but, after having laid on nine or ten inches of soil, thatch the whole over an inch and a half thick, with straw, fern, beech, or any similar non-conducting material; "the object being," he says, "first to exclude frost and wet, and, secondly, to exclude heat; for which purpose earth is not sufficiently a non-conductor of heat and cold."

1525. If the weather is fine when the tubers are taken up, and the potatoes are required for early use, much of this labour may be dispensed with; but if for spring and early summer use, the precautions will be found necessary.

1526. *Carrots*, *Beet*, and other similar root-crops, should be taken up before the frosts set in: they may either be stored in a dry cellar, covered with dry sand, or stored after the manner of the potato. The London market-gardeners winter their beet and carrots in large sheds, stored away in moderately damp mould, and banked up with straw; "for," says Mr. Cuthill, "it is a mistake to pack them all in dry sand or earth for the winter; and the same may be said in regard to carrots, parsnips, salsafy, scorzonera, and other similar roots." By this means, he goes on to say, the roots retain their natural sap, and the colour is preserved.

1527. It is probably unnecessary to add that in roots and tubers, as with fruit, all cut or bruised ones should be thrown aside: when the skin is cut, or a bruise exists, the elements of decay are soon introduced, and all others within reach contaminated. A dry day should be chosen for lifting them, and they should be exposed a few hours before collecting into heaps, that the soil adhering to them may dry.

1528. *Onions* should be lifted a little before they have altogether ceased to row: the leaf turning yellow and beginning to fade will be the signal. As they are taken up, they should be placed in a dry airy place, but without being exposed to the sun. If they are thinly spread out on a dry floor or shelf covered with sand,—or on a gravel walk partially shaded in fine weather will do very well. As they dry, the roughest leaves should be removed; when dry, they should be removed to a warm dry loft, where they can ripen more thoroughly. When in a proper state for storing, they should be gone carefully over and separated, the smallest ones for pickling, the ripest picked out as likely to keep longest: those with portions of leaves to them are best stored by stringing and suspending them from the ceiling of the room, which promotes ripening. The stringing is done by twisting a strong piece of matting or twine round the tails of each in succession, so that they may hang as close together as possible without forming a cluster, until the string is about a yard long, when they are hung up, occupying very little room, while the onions have a good opportunity of ripening.

1529. In collecting seed, the greatest care is required to have it ripe, and that the bags into which it is put are correctly marked. All that is known of the parent plant should be added, if it is other than a common kind, including the soil in which it is found. When collected, before packing away, the seeds should be carefully dried. When they belong to a pulpy fruit, separate the grains from the pulp as soon as decomposition begins, and dry before placing them in bags.

§ 3.—Collecting for Herbaria.

1530. Plants intended for the herbal should be gathered in flower, and when small, they should be taken with the root. The plants, in this state, are placed between leaves of paper prepared for the purpose, and between two boards, or under one, from which they are not removed until they have become perfectly flat. Where there are conveniences for so doing, the packet may, with great advantage, be placed in an oven. When dry, change the paper. Some plants, as orchids and bulbs, will sometimes vegetate for months in the herbal after they have been placed there. If plunged into boiling water for a minute, and immediately afterwards placed between paper, their drying will be more rapid. If the plants are unknown or new, indicate their popular names, the height at which they were procured, and their habit; also their height, as well as their odour.

1531. In order to be prepared for collecting, provide some sheets of paper of a suitable size (16 inches by 12 is a good size) and several boards of the same proportion. These should be formed of two thin boards glued together, the grain of the one transverse to the other. These may be connected together by means of straps, so as to communicate considerable pressure. A large book of blotting-paper between two other similar planks will complete this temporary herbarium.

1532. Insects are the bane of all collections, the herbaria included; and it requires incessant care in order to preserve them and enable them to bear exposure to the air. Sir James Smith used a wash composed of corrosive sublimate two drachms, spirits of wine, in which a small piece of camphor was dissolved, one pint. This wash should be lightly applied, but so that all the raphides of the flowers, and the fleshy parts of the plant, are saturated with it.

1533. Beautiful specimens are prepared by an apparatus to which the name of M. Le Coq, professor of natural history at Clermont-Ferrand, has been given. This apparatus consists of two open covers made of strong iron-wire network, having an iron frame round them, in which the plants are placed between thick blotting-paper. After they have been kept under pressure for a few hours, the covers are compressed by means of straps; and the open network of the frames allows the moisture to escape freely, while the plants are gradually dried.

1534. There is a mode of preparing the skeleton leaves of plants which forms a very beautiful object in itself, but which is still most interesting from the manner in which it exhibits the cellular system of plants, with which we shall conclude these remarks.

1535. Get the leaves from the middle of summer to September; put them in one gallon of soft water, let them soak for about a month, and then take out a leaf and try it; if it is ready, the green coat will rub off directly, and leave the fibre. Some will take two months before they are ready; but you can always tell by rubbing the leaf in the way above described. After obtaining the skeleton of the leaves, place them in one quart of water, with two table-spoonfuls of chloride of lime, well mixed: let them remain about twelve hours, and they will be perfectly white. Keep them in a close box until you want to use them. The best and most ornamental way to mount them, is to get either round or oval shades, and gilt or black stands: cover the stand with velvet, black or coloured, according to taste, and then arrange the leaves so as to form a pretty group when the shade is placed over it: with chenille, it will be a very handsome ornament.

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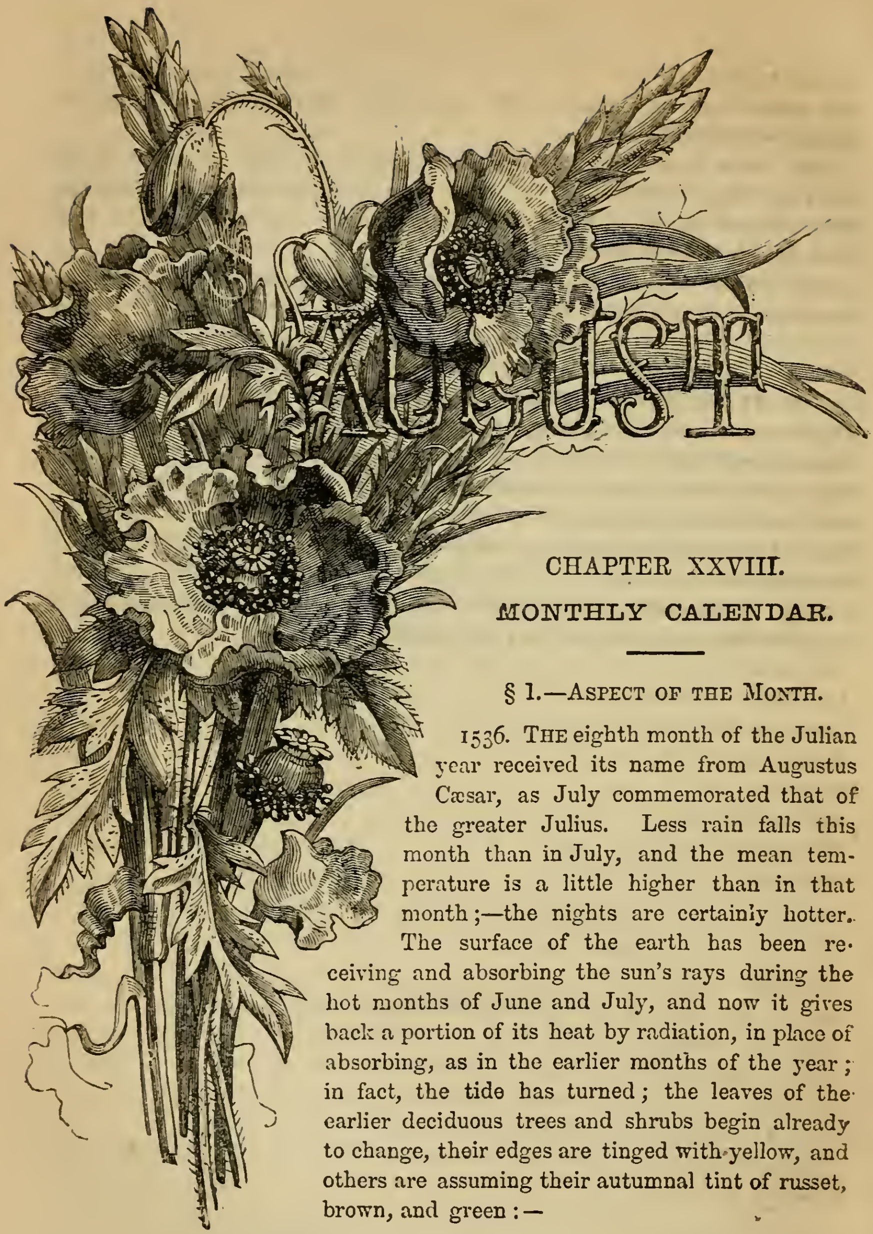

CHAPTER XXVIII.

MONTHLY CALENDAR.

§ 1.—ASPECT OF THE MONTH.

1536. THE eighth month of the Julian year received its name from Augustus Cæsar, as July commemorated that of the greater Julius. Less rain falls this month than in July, and the mean temperature is a little higher than in that month;—the nights are certainly hotter. The surface of the earth has been receiving and absorbing the sun's rays during the hot months of June and July, and now it gives back a portion of its heat by radiation, in place of absorbing, as in the earlier months of the year; in fact, the tide has turned; the leaves of the earlier deciduous trees and shrubs begin already to change, their edges are tinged with yellow, and others are assuming their autumnal tint of russet, brown, and green:—

> "As thou listenest, thou shalt hear
> Distant harvest carols clear,
> Rustle of the reapèd corn,
> Sweet birds antheming the morn."

But for the crop of young leaves, indeed, which still continue to present themselves on the trees, mingling with those of older growth, and blending in one harmonious whole, the glories of mature summer foliage—the "sere and yellow leaf" of autumn with the delicate tints and tender foliage of spring, we should have very decided indications of the fading year.

1537. As it is, the dark green masses of the woods are already relieved, and their edges lighted up by the russet, brown, and yellow, which, under the broad rays of the sun, glitter in golden splendour in the landscape. And then the deep azure of an August sky, and the silvery clouds which float about, and the profound repose which has been so frequently sung and said as the distinguishing feature of the month, both by naturalist and poet, when

> "All heaven and earth are still, though not asleep,
> But breathless, as we grow when feeling most."

1538. The broad fern now arrests the eye with its russet-coloured leaves; the autumnal crocus, with its saffron-coloured petals, is now in bloom, and the lilac-coloured flowers of the wild mint are found in moist and shady places. The pinky petals of the lavender-plant are now in full blossom, filling the air with their sweet perfume; the air is also musical with the hum of bees; the pearly blossoms of spring have disappeared from the hawthorn hedge-rows, to be succeeded by its fruit of pendent rubies.

1539. In the garden, also, August is the "pivot" of the year,—the month in which the gardener may see the full fruition of his hopes, or console himself, as best he may, for any measure of disappointment, by preparations for the future. His beds are now in full bloom, the foliage in its perfection; and under the most perfect arrangement, a fastidious eye will remark deficiencies to be supplied in next year's arrangement; in fact, August is the month when the man of taste must settle his plans for next year. The brilliant dahlia, the gorgeous sunflower, and the lordly-looking hollyhock, have taken the place of the lilies, associated with the magnificent perpetual-blooming roses, and the splendid flowers of the Amaranth family:—

> "Immortal Amaranth, a flower which once
> In Paradise, fast by the Tree of Life,
> Began to bloom."

The humble-blooming, but fragrant mignonette, "our commonest and most tangible memento of the Egyptian campaign" of Nelson and the Nile, with which the world rang in the beginning of the century, for it is a native of Egypt, whence it was brought by some flower-loving follower of the first Napoleon. Since that period, it has become the cherished inhabitant of many a cottage-garden and window-frame.

1540. The mean temperature of August is higher than that of July, being 61·28° at the surface, 61·80° at foot, and 61·26° two feet below.

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§ 2.—FLOWER-GARDEN AND SHRUBBERY.

1541. The flower-garden will now be in its greatest beauty, and every means must be taken to keep turf, gravel, and edgings of all kinds in the neatest order; dead flowers should be picked off daily, and stray growths reduced within proper limits. Trailing and climbing plants should frequently be gone over to keep them neatly trained and secure after high winds; for the same purpose examine hollyhocks, dahlias, and other tall-growing plants. After removing the dead flowers from roses, encourage the production of autumn blooms in the perpetuals, by watering with liquid manure, and mulching the surface of the ground where practicable. Continue the propagation of plants for next season, in which no time must be lost with the more delicate pelargoniums, in order to get them established before winter.

1542. The advantage of decided colours in the massed flower-garden will now become obvious. As the beds get filled up by the extending foliage, the taste of the designer now becomes apparent, not only in the individual beds, but in the general design, which is now perceptible even to the most unobservant. Clear, simple, and intelligible colours, and regular, well-connected figures, are required in geometrical flower-beds; and this is the season when the intelligent gardener can most conveniently reconsider his design, and perfect his arrangements for next year's operations. On this subject we may be excused if we quote some of the lamented Mr. Errington's views, for none of our practical gardeners have done more to impress his brethren with true artistic taste in dealing with this all-important subject. "One of the first essentials in the clumping system," says that gentleman in one of his numerous contributions on the subject, "is to keep up the idea of distinctness; confusion of forms is out of place here. Let the brambles and dog-roses in the 'wilderness' intertwine and smother each other; but distinctness, I say, for the parterre; and the first principle of *distinctness* is to keep every individual flower separate,—no two allowed to touch. . . . . I feel persuaded," he says further on, "that where flower-beds are well conceived, the plants individually healthy and blossoming freely, the relief afforded by intervening portions of cleanly-raked soil is just the sort of relief that suits the eye. With those who require to be taken by surprise through a prurient and false taste, why, mere blazes of colour and sparkling contrasts must be the order of the day. Next to the individuality of plants in a bed, I would suggest that edgings or borderings will be found a useful adjunct in promoting beauty of outline. No flower-bed ever looks satisfactory to me without at least two, if not three, distinct heights, the lowest at the extremity of the bed. Here an edging makes an elegant and artistic finish, especially if it forms a continuous belt, which is easily accomplished by pegging down the plants during the earlier stages, allowing the points to rise in relief as soon as the object has been attained. To put a case: suppose a long oval bed, standing in considerable relief. A row of scarlet cupheas as an edging, no part of them allowed to approach the outer edge of the bed nearer than four inches. Let a row of variegated geraniums be planted in a parallel line, and the interior furnished with Lobelia fulgens, planted in groups of fives: this bed would always give satisfaction, as far as form is concerned. There are many other dwarf flowers, however, better adapted than the cuphea for this purpose: verbenas, Kaulfussias, leptosiphons, pansies, heliotropes, and petunias, are all equally or more suited for forming a continuous band like that indicated.

1543. "High keeping, however, is, after all, the chief element of success in flower-gardening: no combination of form or colour can give satisfaction, if neglect is apparent. The rake should be in frequent use where bare soil is shown. Weeds should never be seen; all disproportioned foliage should be removed. Pegging down should be done early in the season, in order that trusses of flowers may stand fairly in relief, and dress naturally with an air of freedom, combined with neatness. Tying up also requires nice handling; the sticks, while uniform, should be inconspicuous. Flowers once suffered to become crooked are long before they regain their position, and the finest flowers look most inelegant if suffered to get into deshabille through lack of this needful operation."

1544. Such are some of Mr. Errington's views on the arranging of flower-beds, in an abbreviated form, and they may be useful aids to reflection at this season, when the intentions of the gardener and the fulfilment of his design are under consideration. "There is little doubt," he concludes by saying, "that the advice here offered will be impugned by some who are wedded to the ordinary massing system. Such persons may rest assured that dissentients from the clumping method have been on the increase. Will it not be well, then, to anticipate and prepare for a coming change?"

1545. Many of our most beautiful flowering plants may be propagated this month; other varieties may remain for a week or two longer. With the above may be classed crassulas, lantanas, hydrangeas, mesembyranthemums, &c., as they all should be struck early, to flower freely the following season. Petunias, verbenas, heliotropes, salvias, and lobelias, may be taken in hand next, reserving calceolarias till the last, as they strike better during the cold weather of autumn than earlier in the season. Verbenas and calceolarias may be struck under hand-glasses or in a cold frame. Geraniums, including the scarlet varieties, will strike freely on a south border inserted in sandy soil. Anagallis, maurandyas, and lophospermums, may be rooted in sandy soil, if placed in a cold frame, and shaded in bright sunny weather. Maurandya Barclayana rosea is an abundant flowerer, but of undecided colours. Ten-weeks stocks, of various colours, should be sown before the middle of the month, and intermediate stocks to be kept in pots throughout the winter for spring-flowering; and pot a quantity of Bromptons for the same purpose, planting the remainder in a sheltered spot to take their chance through the winter.

1546. Roll lawns well, and meet the rapid growth by frequent mowing. Gravel-walks will likewise require frequent rolling, and surface-weeding, in shady places especially, will be required, or the application of salt and water, to eradicate the smaller weeds, mosses, &c., after which they should be well rolled to make the surface firm and even.

1547. Plant out all recently-struck pinks, double wallflowers, and pansies, keeping a few of the latter in pots for protection during the winter. Now that the planting-out season may be considered over, attention should at once be directed towards furnishing a supply of plants for another year. The class of plants which will require propagation first are geraniums, of which both the fancy and common bedding kinds must be struck in time to get established in small pots before winter, and the different scarlets and horseshoe-leaved cinerarias,—there is no plant more useful for decorative purposes; many are, besides, deliciously fragrant, and there is none whose cultivation is more simple. At this time the plants sown in June should be dwarf and compact specimens; select healthy plants from those potted off in July, which will now be about three inches high and well rooted; and shift them into 5-inch pots, in a compost of good turfy loam and well-decomposed cow-dung, mixed with a little leaf-mould and silver sand, to keep the soil open; giving plenty of good drainage, which is essential to the health of these plants. When well rooted in the new pots, pinch out the leading shoots. When they have made fresh growth, look carefully over them again, and pinch out all weak shoots, and such of the old leaves as interfere with the free circulation of light and air round the stems, and place them thinly near to the glass in the front of the green-house, cold pit, or frame; in the latter case, raising the lights on flowerpots to secure free ventilation. When they have made considerable progress, a second shift may be given, using the same compost. In February give a final shift, when a stronger compost should be used, adding to the former a little well-decomposed night-soil, or an increased quantity of cow-dung, with a smaller supply of leaf-mould. Continue to thin weak shoots and superfluous leaves, in order to throw the whole vigour of the growth into the leading shoots. When strong enough, stake them, and tie them out as wide as possible: by this means the side-shoots will soon fill up the intermediate spaces. Fumigate frequently, to prevent the green-fly, which is the pest of this plant.

1548. When the pot is pretty well filled with roots, water with liquid manure, which will preserve the leaves in a fresh green state, and give additional brilliancy to the flowers.

1549. Seeds sown in the beginning of August, and potted off into store pots when large enough, make good plants for spring purposes. Potting into store pots prepares them for separate potting; their after-treatment being the same as above. The process of stopping retards their bloom, and strengthens the flowers: where earlier bloom is required, therefore, a modified treatment is to be adopted. When the flowering season is over, remove them to a shaded place, preserving all the leaves, and watering slightly, guarding them from insects until August, when cuttings may be taken from the old roots. When these are separated from the plant, the roots may also be separated and potted out; every particle of the root being capable, under proper treatment, of propagating a plant; these old ones being the best plants for early flowering, they may be divided even up to October.

1550. Mr. Glenny has given a very interesting monograph of this flower in the "Gardener's Magazine of Botany," in which he justly assumes the merit of having contributed largely to the perfection of this flower, by defining the properties to be aimed at by the growers. He tells us that the texture of the petals is naturally rough and stripy, the colours naturally dull, and the flower a narrow-petalled star; so that, unless the petals be very dense and bright in colour, it will be ineffective. "To make a truly fine cineraria," he says, "we must have a white ground, which renders any colours a good contrast, the most striking being crimsons and blues. The edging should be even, forming an even band of colour alike all round, and having a well-defined circle of white surrounding a disk of some determinate colour. This disk, then, should be white on the ground, distinctly banded with a dense colour of some kind, the greater the contrast the better; the disk being small, dark-coloured, or bright yellow; the petals smooth and velvety,—no ribs or pinkers; the bloom flat and round; or if they deviate, by cupping rather than reflexing; the foliage spreading, green, and even; above which the flowers should form an even surface of bloom, the flowers setting edge to edge, and perfectly circular; the ends of the petals free from notch, with a distinct edge of colour; thick at the edge, and the flowers opening flat."

1551. *Rose-Garden.*—Perpetual-flowering roses in dry weather require copious supplies of water. If mildew appears, forming white spots on any of them, syringe the plant with soft water in the evening, and dust the affected part with flour of sulphur. Towards the end of the month any roses budded last month may have the bandages removed and the place examined to see that nothing has interfered with the bud, and the bandage restored. Cuttings of Tea-scented, Noisette, China, Bourbon, and Hybrid perpetuals, may be struck in light sandy soil over a gentle hotbed. When rooted, pot off and replace in the frames for a few days till the roots begin to move, when they are to be removed and hardened off.

1552. The Ayrshire, Boursault, Sempervirens, and other climbing roses, frequently send out very luxuriant shoots near the bottom of the stem. These, if not wanted to cover some weak part of the plant, should be removed. Roses standing in pots should never be crowded, but constantly watered and kept in a growing state.

1553. *Geraniums* may be propagated by thinning out the beds here and there, without much injury to them, and inserted in small beds on a border, putting a little silver sand in the holes made to receive the cuttings. Intermediate stocks should be sown early in the month, and ten-weeks stocks before the middle. All double-flowering perennials done flowering may be propagated by slips, and parting the roots towards the end of the month, taking up the whole plant, and dividing it into as many separate plants as there are roots with buds, eyes, or stems. Let every root be trimmed by cutting off the straggling parts or injured roots, picking off all dead leaves, planting them in some shady border, and giving some water. *Pyramidal Saxifrage* should now be propagated: the offsets rise from the sides of the plant, and may now be taken off and planted either in borders or pots.

1554. Flower-borders, shrubberies, grass and gravel walks, now require the most vigilant attention; the borders should be gone over with the hoe and rake; all weeds being raked off, and straggling shoots either removed, shortened, or tied down, and dead footstalks and flowers removed. In shrubberies prune off all exuberant branches, keeping up a dwarf and full foliage, and watering where required. Grass walks and lawns require mowing once a week or fortnight, according to its growth, keeping it short, thick, and even, and choosing dewy mornings for the operation; the walks rolled clean, and free from weeds; lawns poled occasionally.

1555. *Autumnal Bulbs,* such as colchicums, narcissuses, Guernsey lily, and amaryllis, may still be planted in borders, beds, or pots, in light sandy loam.

1556. *Florists' Flowers.*—*Carnations* and *Picotees* should now be layered, but without shortening the grass. Where seed is required, pick off all decaying petals, to prevent damp injuring the pods. If not wanted for seed, cut down the stems.

1557. *Dahlias* now require constant watering and attention to tying out lateral shoots, removing superfluous ones, and relaxing the ties. Stir the soil, but not deeply, and give special attention to seedlings, selecting those worth preserving, and throwing away worthless varieties. Attend to the training and thinning of the shoots of dahlias: place small inverted pots, with a little dry moss in them, on the top of stakes, for a trap for earwigs.

1558. *Hollyhocks* require the same attention as to staking and selecting.

1559. *Pinks.*—First-struck pipings may now be planted out, potting a quantity in order to fill up vacancies which may be caused from the ravages of the wireworm, &c. Make pansy-beds.

1560. Clean and prepare tulip-beds, and arrange the plants in their drawers, discarding stained varieties, and adding new ones in their place.

§ 3.—MIXED FLOWER AND KITCHEN GARDEN.

1561. The early crops of *Celery* should be carefully examined for slugs before earthing-up; if any appear, a sowing of lime or soot will remove them: a piece of ground may still be prepared for a late crop, as directed in previous months. *Cardoons* will soon require earthing-up; *Asparagus-beds* should be kept well cleared of weeds, and the seedling beds, if any, kept clear by hand-weeding. *Peas* and *Beans* are gradually coming on: let them be sticked and earthed-up betimes: and as they appear, let the haum disappear with them. *Early Horn Carrots* should be sown on a sheltered south aspect. In some situations *Onions* will be ready to harvest, and require timely attention; taking care that they are thoroughly matured and dry before storing away. A good breadth of *Turnips* should also be sown on a piece of spare ground.

1562. Supposing that the principal quarters are already occupied by savoys, Brussels sprouts, broccoli, Scotch and other kales, as directed in the previous months, *Broccoli* may still be planted in an open quarter. Attention should now be given to the spaces occupied by early cauliflowers. The peas and beans will be succeeded by coleworts and spring broccoli, and a sowing of Wheeler's imperial cabbage, to stand the winter. Cauliflowers should be sown in the early part of the month, and another sowing towards the end, and a piece of ground prepared by deep trenching and forking over, to be ready when the plants are ready to plant out. *Surface-crops*, such as *Prickly Spinach*, should now be sown to stand the winter; *Radishes* sown twice each month on a warm border, for autumn use; and small salads still sown as in former months; *Endive* and *Lettuce* transplanted periodically for succession. Pickling cucumbers on ridges will now be ready to gather.

1563. Clean walks and edgings, and keep everything neat and tidy in the kitchen-garden.

1564. *Fruit-Garden.*—Apricots and peaches are now ripening rapidly, and should be exposed to the sun as much as possible to give them colour. Keep the shoots laid in closely, and remove obstructing leaves, always leaving enough for the elaboration of the juices of the tree. Suspend nets, supported by short stakes beneath the tree, as the ripening period approaches, to catch any falling fruit, with some soft material in the net to soften the fall. Netting of a fine mesh is also used successfully to keep off the attacks of wasps and flies. Strong shoots that have been stopped have now thrown out laterals, which should be thinned to the number required to cover their allotted space, so that the wood may be thoroughly ripened in the August sun. Should mildew appear, dust with flour of sulphur. If attacked by insects, wash the trees with soap-suds, syringing afterwards with clear water. *Apples* and *Pears*, heavily laden, require to have their branches supported; those against walls and espaliers, pretty closely stopped. *Cherries.*—As the fruit is gathered from the earlier sorts, remove the nettings, and wash the trees well with the engine, and Morello cherries on north walls, covered with nets. *Gooseberries* and *Currants* required for late use must be tied up in matting; those on walls by canvas or mats nailed over them. By this means such varieties as the Red Warrington may be preserved till November. *Raspberry-canes* done bearing may now be cut away, as well as weak shoots of the current year, leaving only four or five strong canes in the stools, tied to stakes. Autumn-bearing varieties must always be secured to stakes as they grow.

1565. *Strawberries.*—New plantations must no longer be delayed, if fruit is expected of them next year; or, if plantations cannot be made now, bed out the plants, so that they may be transplanted during the spring, keeping all the leaves attached to the plants. The strawberry requires a deep porous and highly-enriched and well-drained soil. The best natural soil would be what is called a hazel loam, retentive, but not too adhesive, and trenched at least three feet deep, and the bottom of each spit enriched with three or four inches of well-rotted stable-manure. This being trenched in in the winter or spring, the land should be kept moved and stirred about as much as possible until the plants are ready for planting.

1566. In the market-gardens this planting takes place in June, choosing generally an old celery-bed; trenching it deeply and planting immediately, and watering copiously until the plants are established. Where this is not available, the system is to prepare a piece of ground by trenching and manuring as above, marking it into 4-feet beds, with 15-inch alleys between. In autumn or early spring, a row of strong plants are planted in the alleys, and the beds between cropped with summer lettuce. As the strawberries advance in growth, the young plants from the runners are carefully layered among the lettuce, and soon become strong, vigorous plants, producing heavy crops of very large fruit.

1567. In small gardens, strawberry banks or terraces are an excellent device; they are formed as follows:—A space of ground of any given length, and six feet wide, being marked out, a wall nine inches high is formed of stones, flints, or old wood, the space between the walls being filled with compost, such as we have described. Upon this compost and nine inches within the first walls, two more are added and filled up in the same way; and thus the work proceeds, a row of plants occupying the space between each pair of walls, until the space comes to a single row of plants at the top. In a bank of this kind, the walls, if running due east and west, insure both a very early and very late supply of fruit, and it may be planted at any time, taking care, at planting, that the ground slopes inward slightly, so as to secure a full supply of moisture at the roots. Stones, clinkers from the furnace, or other arrangements for preventing evaporation, and providing a clean surface for the fruit to rest upon, are easily applied to this mode of cultivation; while copious waterings with manure-water from the time the plants show blossoms until the fruit is ripe, will greatly assist this or any other system of cultivation.

§ 4.—KITCHEN-GARDEN.

1568. The gardener who would have everything thrive and prosper, must exercise the greatest vigilance during this month. Apart from the necessity of cropping and removing such as have ceased to become profitable, his attention is drawn towards the multitudes of garden pests, which exhibit their effects at this time of the year more than any other. Caterpillars should be looked for, and destroyed as quickly as they can be discovered,—at least, before they fatten on the produce of the garden, which they will do to the deterioration of the crops in a very short time, if not prevented. The ravages of these insects produce an effect at once unsightly and discreditable. Savoys and cabbages, riddled by caterpillars, are at once unpleasant to the eye and suggestive of neglect. A free use of lime, which should be scattered over the plants on dewy mornings, will, in a great measure, save them: the insects should, nevertheless, be hunted and destroyed on every possible occasion. The wireworm and other insects become troublesome at this time, and may be trapped by means of potatoes cut in half, and the cut sides laid downwards. I find it a good plan to trench all the vacant ground at this time of the year: grubs and wireworm are then buried deep enough to destroy them. The effects of the club become apparent in hot sunny days: cabbages, &c., hang down and turn blue, and often become infested with aphis. This disease I consider the most vexatious with which the gardener has to deal. How far it may be prevented by the use of wood-ashes, &c., is a matter of doubt; still I believe the causes of it may be traced; and of these two are most prominent: first, an injudicious application of manure in small gardens that are already too manured,—I find this most prevalent; second, the exhausted state of the soil arising from the too unvaried use to which it is put. The plants that are subject to the disease are strong feeders, and exhaust the soil very much; but it is reasonable to suppose they leave food suitable for other plants. I have known instances of ground being left to weeds for several years, when, although cabbages clubbed badly before, they did not after the vacation; the ground showing a fertility that would justify any one in believing that weeds have a wonderful faculty for restoring ground that had been exhausted by kitchen crops.

1569. It is the practice in some gardens to have the orchard, or at least the fine-fruit garden, within the walls of the kitchen-garden, and even to form edgings to the vegetable quarters with them, and this is a time of preparation for planting. As the kitchen-garden is usually inclosed by walls, it may be desirable to adopt this arrangement; but the edging system should be avoided, and fruit-trees, as well as bush-fruit, have a quarter appropriated to themselves. Selecting a piece of ground which has been continually cropped, proceed to plant the young bushes of currants, gooseberry, and raspberry, in rows of about eight feet apart for gooseberries and currants, and six for raspberries, and about two feet less in the rows. While the bushes are very young and small, the ground between the bushes may be cropped with almost anything required, but may be particularly useful for raising asparagus or seakale plants for forcing, or it may be planted with strawberries. As the bushes increase in size, let them have all the room they require; plant nothing between that will crowd them, for the nearer the roots of these bushes approach the surface, the better and more abundant will be the fruit. It is not advisable to dig the ground where the root-fibres are likely to be; after a time, therefore, the ground should never be disturbed, and where manure is required, let it be applied as mulch; that is, lay the manure on the surface, and the bushes will receive the benefit of it as much as if dug in. Of course, weeds will grow, the chief of which are grasses, and they are to perform an important part in restoring the ground to fertility. They should be mowed occasionally, to prevent them getting too tall, so as to interfere with the trees, and in a measure to prevent seeding. These bushes will bear fruit in great abundance for eight, ten, or twelve years; by that time the bushes will be nearly exhausted, and the ground restored to a fertile condition for kitchen crops. Brassicæ which formerly went off with the club, and peas which turned yellow before their time, will grow now in perfection; and if the ground is kept in order by flat-digging or by bastard trenching, cabbages will be less likely to club. Various causes are given as to the origin of this disease; some asserting that it is the work of insects (of which there can be no doubt), while others say it is a disease in the plant itself, produced by an inadequate supply of nutriment in the soil. Both these causes probably work together in producing this disease, which is the bane of most old gardens, the only remedy being a judicious system of rotation-cropping and manuring.

1570. The modern fruit-garden may be described as orchards in miniature. Certainly they are more manageable, doubly interesting, and equally productive with orchards. In the plan already referred to, I have indicated two compartments as *Fruit-garden.* They are intended to be furnished with apples on the Paradise stock, pears on the quince, and cherries and plums on the most dwarf stocks that can be procured. Careful summer stopping, root-pruning, and the pyramidal form, describe the main features of their treatment and training; and abundance of good fruit is, of course, the ultimate object. They may be planted in rows from 7 to 10 feet apart, and the same distance between each plant. On good soils they succeed well on the level of the ground; on heavy clays, or other unfavourable bottoms, the ground can be thrown into this form. This is better than raising a separate mound for each tree. The bottom of these mounds may be occupied with a standard gooseberry or currant, which bear admirably trained a single stem in this manner; and the sides can be occupied with salading. A fruit-garden thus formed is quite a scene of beauty when the trees are in flower, and very enjoyable at all times. I am so tired of the old squat bush appearance of gooseberries and currants, that I intend to confine them as speedily as possible to pyramids and wire espalier. Trained thus, they look well, alternated with apples and pears, or in a compartment by themselves; fruit quite as finely, are as easily protected, much easier gathered, and have quite an imposing, noble appearance.

1571. *Asparagus.*—Keep the beds clear of weeds, especially young plants which are soon overrun by them. Unless seed is wanted, it is advisable to cut off most of the bearing heads, which would, if left, exhaust and weaken the roots in ripening the seed: it is, however, as well to sow every year, and some of the seed may be left for the purpose.

1572. *Artichokes.*—Cut these down as the heads are gathered, and fork the ground between,—they will come up again before winter.

1573. *Beans.*—Pull up the haum of any that have done bearing: lay the stalks together, and they will soon rot, or dry them, and they will burn. Some may be cut in lengths, and dried for earwig-traps, to place among flowering plants.

1574. *Running-Beans* should be stopped after reaching the top of the sticks: they will set quicker than if left to grow as they please. Give plenty of water at the roots if necessary, but none overhead.

1575. *Peas.*—Pull up as soon as all are gathered: it is not advisable to leave them a moment longer. The haum may be dried in the sun, and will be useful in winter for covering and protecting many things from frost. The sticks should be tied in bundles, and stowed away.

1576. *Celery.*—This may be got out in any quantity. If young plants are used, and kept growing, they will stand the winter well, but must not be earthed-up till November; that put out in June, may now be earthed up for blanching. It is not advisable to earth-up too quickly, or too much at a time; but there is less danger of doing harm by it now, than in cold or wet weather. As it grows quickly at this time, three weeks will blanch it; but it should be quite moist at the roots before being banked up.

1577. *Carrots.*—Early sowings may be taken up and stowed away for use; but if the ground is not particularly wanted for other crops, it is quite as well to let them remain till required for use. A little seed may be sown early this month to stand the winter: they will be useful in the spring, when the winter store is exhausted.

1578. *Onions* will most likely be arriving at maturity, and had better be pulled up as soon as this is the case, and laid on their sides. Green thick-necked ones had better be turned down at the collar, and should be used first. It is necessary to ripen them thoroughly before storing them away. Potato-onions should be taken up as soon as the stalks have decayed. Garlic, shallots, &c., will most likely be fit to take up this month, and may be treated in the same way as onions; that is, ripened in the open air, and stored away in a dry airy shed, or left beyond the reach of frost. Sow Tripoli, globe, or Welsh hardy, to stand the winter, for planting out in spring, or for salading: a warm sunny border is the most suitable place for sowing them.

1579. *Leeks* may still be transplanted, but the sooner the better, or they will not get any size before winter. Plant in deep drills two feet or so apart, and water freely: draw earth up to those in full growth. Liquid manure given occasionally will benefit them.

1580. *Parsnips.*—Stir the ground well between, so that the rain may penetrate quickly. Destroy weeds, and keep the crops clean.

1581. *Potatoes.*—Early crops will be ready for taking up; but they will take no harm if left in the ground till wanted. If the disease appears in the haum, remove it instantly from late crops, if it is desired to save the tubers; they will not be so large, but small and good is better than large and bad.

1582. *Turnips* may be sown any time this month: they will not, probably, grow large, but will be useful in February and March for the early greens which they yield; they may be left thicker than early sowings. Continue to use the hoe unsparingly among advancing crops, for this is most important in the culture of the turnip.

1583. *Surface Crops—French Beans.*—A row or two should be left for seed. It is not advisable to leave any to ripen on bearing plants, as they cease to yield for the table while ripening seed.

1584. *Lettuce.*—The first week in this month sow cabbage-lettuce for winter use. From that time forward, both cos and cabbage-lettuce may be sown to stand the winter for spring use: sow rather thin on an open spot, as it is proper to have these as stout and strong as possible; they will stand the weather much better.

1585. *Endive.*—Sow early this month for the last time this season; plant out as soon as large enough to do so conveniently: a good watering now and then, after planting, is all the attention they require. When they are ready for blanching, use inverted flowerpots with the hole stopped; but by no means tuck the leaves into them: merely clap a 24-pot over the centre. I find this the best way of blanching them.

1586. *Spinach.*—About the second week in this month sow the main crop of winter spinach: where a good supply of this is wanted, it would be best to sow every week this month. The earliest sown will grow quickly, but the later will stand the winter best, and prove valuable in the spring: sow in drills a foot apart, or sow, thinly, broadcast, treading it in either case.

1587. *Radish* may be sown any time this month. The Black Spanish should be sown early this month for winter use. It takes rather longer than other sorts to arrive at a useful state, but may be treated in a similar manner to the others, except giving them more room.

1588. *Tomatoes.*—Attend to these as directed last month. To have these bear well in our short seasons, it is necessary to aid them as much as possible, by pinching out all superfluous growth, exposing the flowers well, and training as close to the wall as possible.

1589. *Exhausters* (*Broccoli, Brussels Sprouts, &c.*) should be got out as soon as possible. It is useless to plant them after this month. Broccoli that are about heading should receive plenty of water and liquid manure two or three times a week, to insure their being fine.

1590. *Cabbage.*—Sow early this month for a full crop of summer cabbage. Sow thinly on an open spot, that they may come up strong, and scatter lime on the ground to protect from birds and insects; dust also the young plants when up: get out a a supply of early coleworts: they will most likely make small head in November.

1591. *Cauliflower* should be sown two or three times this month: if sown at the beginning, about the middle, and at the end of the month, it will give a succession. Sow in the same way as cabbage. It will be necessary to give them the protection of frames or hand-lights during the winter; but the sowing may be in the open ground.

1592. The gathering and drying of herbs should proceed with all possible despatch, and should not be left later than this month. The propagation of herbs, if not done before, should be finished up this month; they will do little good if disturbed after.

§ 5.—THE FRUIT-GARDEN.

1593. Keep a sharp look-out over wall-trees; for snails, wasps, and flies, are as fond of choice fruit as man himself. Snails will attack peaches, nectarines, &c., before they are ripe, and spoil the appearance of every fruit they approach. Finding out their haunts, and picking them out with the hand, is, after all, I believe, the best mode of dealing with them; they are, then, easily destroyed by throwing them into salt and water. Wasps and flies must be dealt with another way, for it is scarcely likely that any one will stand by the trees all day for the purpose of catching them with the hand. An old-fashioned plan is to hang bottles, containing sugar and beer-dregs, about the trees, in order to entrap them; but this is objectionable on account of its unsightly appearance. I would not recommend syringing with any solution or compound, which might deteriorate the flavour of the fruit, but cover with suitable netting. This, however, may possibly not be required, for insects are more or less abundant in different seasons; but apricots, as soon as they happen to crack, are sure to be attacked; and as this sometimes happens before the fruit is thoroughly ripe, it is always advisable to cover them.

1594. Tack in all useful wood. This should not be omitted this month,—they will scarcely require it after: remove every shoot that is not really wanted; every scrap of wood that is not useful may as well be removed now as at any other time. As it is not proper to drench the trees when the fruit is ripe, or ripening, any shoots infested with aphis should be cleaned with a brush, or by dipping in thick puddle.

1595. Standard trees, where a regular thinning is not adopted, should be shaken occasionally, to bring down any fruit that may be blighted. These can be no good on the trees, and the sooner got rid of the better.

1596. Towards the latter end of this month raspberries have generally ceased bearing, and the old cones may be cut down: as they will be of no further service, they are in the way, and should be got rid of, which gives the new cones a chance to strengthen and maturate the shoots; but those wanted for the next year's bearing may be cut away; it will then be advisable to fork the ground over. This will destroy weeds, and give a fresh appearance, besides admitting rain. All borders about fruit-trees should receive a forking about this time. Currants—where any fruit is near the ground, that should be gathered first, as the splashing of rain is apt to spoil it. If trees are netted over so as to be impervious to birds, flies, &c., these fruits will keep good on the trees till late in the year. Black currants will not keep on the trees, and had better be gathered as soon as ripe.

1597. Strawberry-beds may be planted; but it is advisable to get the planting done as soon as possible, if a crop of fruit is expected the following year. Even now it is a good plan to lay the runners in pots, if it can be done; but, generally, it will be found that strong runners have already rooted by this time, and may be removed with a trowel. Plenty of water is necessary at this time to newly-planted things.

1598. July and August is generally the time for budding fruit-trees: if any stocks are to be budded with different or better sorts, it should be done without delay. Any peaches, nectarines, or other wall-trees that are scanty, or unfurnished with wood in any part, may be altered considerably by the insertion of a few beds. This subject has been entered into at length in a former page; it is, therefore, unnecessary to repeat; but a hint to remind the young gardener is often of great advantage, and probably may save the loss of a season.

§ 6.—PLANT-CULTURE UNDER GLASS.

1599. *Conservatory.*—Flowers are now so abundant in the open ground that an equal profusion would be in bad taste. Those that remain should now have plenty of room and a free circulation of air. Camellias and acacias now require copious watering, taking care that they are not started into second growth. Sprinkle borders daily, and keep up a moist atmosphere. Train and prune all climbing plants in graceful festoons, avoiding stiff formal tying-in, which prevents free flowering in plants of a climbing habit. All plants intended for early forcing should now be placed so that the wood may be thoroughly ripened, for on that chiefly depends the future bloom. Strong-growing plants, such as diosmas, the epacridæ, coleonemas, which have been in shade to prolong their flowering, should now be placed in a bright sunny place. Late-flowering *Azaleas* now require shifting and training, so that the foliage draws out properly before winter. On the slightest indication of thrips, fumigate. *Camellias* also require shifting, if not done last month. When they have rooted in the new soil, give them plenty of air day and night, and syringe freely three or four times a week in fine weather. *Daphne indica*, both red and white, as well as *Magnolia fuscata*, are very suitable companions to the camellia, requiring exactly similar treatment and temperature. *Pelargoniums* which have gone out of flower should be exposed in the open air to ripen their wood preparatory to being cut down in September.

1600. The principal plants that decorate the conservatory at this season will be with some of the more common annuals,—fuchsias, scarlet geraniums, with achimenes; and where there is room, a considerable number of stove-plants and orchids may be safely introduced; and if, in addition, a few palms, &c., be added, they will give the charm of tropical scenery to the house, and render it more attractive. Brugmansias, and other gross-feeding plants, may be liberally supplied with liquid manure to maintain them in vigorous health, and at the same time to prolong the period of their blooming.

1601. The climbing plants will require going over at short intervals to keep the strong growers within limits: any shoots which have done blooming may be cut in, which, in many species, will induce a second flowering. Examine plants out of doors; and any appearing to suffer from rain, &c., should be at once removed under glass.

1602. Some of the earlier-started orchids will have ripened their growth, and may now be removed to a cooler and drier house, where they can slowly progress to a state of rest. As the plants approach a state of maturity, more light may be allowed them, which will help to ripen the pseudo bulbs. Continue to plants yet growing the requisite amount of heat and moisture to carry on the present year's growth, but avoid unnecessary stimulants at this season, which might induce a fresh growth, which to many species would be injurious to their blooming next season. Fires will be necessary during cold nights; but lessen the shade, except in bright weather. Plants suspended on blocks and baskets must be daily examined to see the growing material is kept sufficiently moist, while, at the same time, stagnant damp must be avoided.

1603. As light decreases, shading must likewise be gradually lessened, and in a short time discontinued altogether, except to a section of orchids, which will require it for some time longer. We have, in a former part, adverted to the importance of well ripening the wood of plants (hard-wooded ones especially) intended to bloom in perfection next season, and we allude to it again, as the year's growth by this time will, in all likelihood, be completed, and the remainder of the autumn should be devoted to maturing the season's growth. Exposure to the full influence of light and air, which are the principal agents to effect this purpose, is essential; and although water in sufficient quantities must be given to meet the plants' requirements, they should not have more, as an extra supply of water might, in some instances, induce an autumnal growth. It will be better to soak each plant well when requiring water, and then allow it to become somewhat dry, than merely to damp the surface only daily, while the principal parts of the roots are suffering.

1604. Achimenes, as they go out of bloom, may be placed in a frame to ripen their tubers, exposing them fully to the sun, but keeping them rather dry. If the different varieties of epiphyllum have made their growth under glass, they may be removed to a sunny spot out of doors. Pot off seedling cinerarias, Chinese primroses, and calceolarias from the seed-pans when the plants are large enough for the purpose.

1605. As stove-plants in the conservatory go out of bloom, remove them to a house of medium temperature to ripen, unless they are likely to bloom again, when they should be removed to the stove and be heated, so as to bring on successional flowers. Some of the free-growing stove-plants, as justicias, eranthemums, &c., may require a small shift, or the foliage is apt to become sickly. Let the whole have air liberally to induce a stocky growth.

1606. Towards the end of the month the conservatory and show-house will be gay with the different varieties of Lilium lancifolium, fuchsias, neriums, balsams, achimenes, &c., in addition to a selection from the stove and orchid-house. As light will now be decreasing, the conservatory climbers may be pruned back, selecting those shoots for the purpose that have nearly done flowering. This will allow more light to fall on the plants below, and will prove advantageous to the ripening of their wood. Vigorous-growing plants, whether out in the open border or in pots, must be liberally supplied with water. Brugmansias especially should have liquid manure to enable them to bloom in perfection. Amaryllids which have perfected their growth may be placed in a dry place to winter. There is one section of this tribe, however, with elongated bulbs, which will not bear to be kept entirely without water, even when in a state of rest. These latter, with Pancratium speciosum and fragrans, &c., should be placed on the back shelves of a vinery, or any house of medium temperature, supplying them only with water sufficient to keep their foliage from dying off. Complete the potting of chrysanthemums, and plunge them in ashes or sawdust to save watering. Stake neatly, and stop mildew wherever it appears, by dusting a little flour of sulphur over the infected leaves. Water with liquid manure freely.

§ 7.—Fruit-Culture under Glass.

1607. *Vinery.*—Whenever the leaves in the early-house show indications of ripening, the sashes should be removed and the vines fully exposed: beyond stopping any late laterals, the vines should not be touched until the leaves fall. While the vines are thus exposed, the sashes, rafters, &c., should be put into a state of repair, and painted, that everything may be in good order when the time for forcing again arrives. If the sashes are not wanted for repairing, they may be used for a variety of purposes, such as ripening grapes, peaches, &c., against walls, forwarding tomatoes, or to assist in the propagation of bedding-stuff. Young vines, planted during the past or present season, should be stopped when once they reach the top of the house. Where the rods, however, are intended to carry fruit next season, and the vines are growing freely, six or eight joints beyond where it is intended to cut them back should be left, as a too close stopping might cause the principal eyes to break, and endanger next season's show of fruit. Lateral shoots, after this, may be kept stopped back pretty close, as the object will now be more to ripen the existing wood than to encourage fresh growth.

1608. Besides looking over ripe grapes to remove decayed berries and stopping the lateral shoots as they are formed, there are not many instructions to be given for the vinery this month.

1609. Fires, especially to houses containing Muscat grapes, should be made each evening and during wet dull days, that abundant ventilation may be kept on. Vines in pots, intended to fruit next season, must be closely watched to get the wood perfectly ripened. As they have now completed their growth, liquid manure may be given pretty freely to swell out the buds to carry next season's crop. The plants must be kept close to the glass, and thus exposed to the full influence of light: great care should be taken of the principal leaves as the wood assumes a brown hue. Lessen the water by degrees, and allow (if practicable) a lower night temperature.

1610. *Pinery.*—As soon as the house for next season's fruiting is ready, the plants should be transferred there at once: the most forward plants should be selected, and have their final shift before removal. When it is desirable to have fruit early, say in April or May, the fruiting-pot must not be too large, as it will be necessary to get the plants into rest early. As a rule, they should have their pots well filled with roots by the middle of September; and while growing, allow them all the light you can command, and a proportionate quantity of air. The best pines for very early forcing are the black Antigua common Queen, and the Providence: to assist them, a few Jamaicas may be started in October, as they take a couple of months longer to ripen. The plants for the summer crop may remain for a week or two, unless there are reasons for potting them immediately. They may have a larger shift than recommended for the above, and should be kept longer growing in the autumn.

1611. As the plants are to ripen their fruit in the pots they are now placed in, the size will be regulated by the kind of pine grown, and in some measure by the size of the plant. For queens and pines of similar habit, pots of from 12 to 15 inches diameter will be sufficiently large; while pots from 15 to 18 inches will be quite large enough for the largest Providences and Cayennes. We have recommended the largest-sized pots, supposing the plants are well grown and in vigorous health; but nothing but disappointment will follow placing pines in large pots, when the pots in which they are growing are not filled with roots to justify shifting them. Much, however, the easiest and cheapest way to grow pines, is to have them planted on a bed of soil furnished with bottom-heat, either by hot-water pipes, or by applying hot dung underneath; the soil being supported by brickwork and slates, or rough boards. The bottom-heat required will be from 85° to 95°, and the soil may be turfy loam and peat, with sand and leaf-mould, varying the latter as the loam is heavy or light. If the plants are growing in pots, they may be turned out into the beds whenever the bottom-heat is right; a few of the outside roots being liberated, and the soil carefully packed round the balls as you proceed. The bed should be brought pretty close up to the glass; for as the plants will grow vigorously during the autumn, they will require an abundance of light, assisted by a liberal supply of air, to check vegetation and mature the fruit. In planting out or growing in pots, always allow plenty of room between the plants, that the leaves may spread themselves in an horizontal direction, and thus expose their surface better to the light; and it should likewise be a point that the light and air should reach the lower leaves, which can never be the case when they are crowded together. Directly the succession-plants are removed to the fruiting-house, the younger plants intended to succeed later next season, and suckers, should be re-shifted and plunged to occupy their places. After the suckers, &c., are potted and plunged, keep them rather close for a few days till they begin to grow, after which expose them to light and air.

1612. Pines in fruit will require water often, as the pots at this time will be fuller of roots than earlier in the season. Syringe well each; warm, and close the house afterwards. The pines for winter fruiting will now be in bloom, and while such is the case be careful to keep the syringe from the flowers.

1613. *Peaches.*—As the houses are cleared of fruit, the trees should be gone over, and the wood not required for fruit next season should be cut away: tie the remaining shoots neatly in, without injuring the leaves, removing the laterals as you proceed : this will allow more light and air to reach the shoots intended to carry next season's fruit, and assist towards maturing well-developed fruit-buds. To ripen the wood, close up the house early in the afternoon with a temperature of 85°. In the evening again open the house as much as the sashes will allow : fires should be made in wet weather, accompanied by air. The aim should be a dry and rather high temperature by day, and as cold a one by night as circumstances permit. Keep down red spider by well syringing every morning, with air on the house. When the leaves begin to change colour, and the wood becomes brown up to the point, the sashes may be removed. Fruit-trees in pots, intended for forcing, if the wood is well ripened, supposing they have been growing under glass, may be removed to the foot of a south wall, and in a few weeks to a shady cool place to rest.

1614. *Melons.*—The late crop will be advancing ; and as light is decreasing, keep the vines further apart, that the leaves, as they are formed, may not crowd each other. Attend carefully to bottom-heat, which must not be allowed to decline. Red spider must be kept in check, by now and then washing the interior walls with lime and sulphur. Water cautiously, but do not allow the growing plants to get dry, which would check them and induce the attacks of spider. To grow melons in perfection, they should progress regularly : hence the necessity for steady bottom-heat, and close watching as regards watering during the entire period of their growth.

1615. Cucumbers, as the nights get colder, may have a slight covering, and the bottom-heat, if declining, should be renewed. Keep down mildew with sulphur : the covering by night, and the increased bottom-heat, will, however, help to keep this in check.

§ 8.—HOTBED AND FRAME CULTIVATION.

1616. In a large establishment there are many purposes to which frames can be applied at this time of the year, both for kitchen-garden, floral, and other departments. It is a good time to strike the winter stock of bedding-plants, for raising cinerarias, &c., for which purpose the bed described last month will be useful. Frames without the hotbed are also very useful. Mignonette, nemophila, and other annuals sown now in pots, and kept in cold frames, will flower in the winter. Horn carrots sown now in the manner described in January will be useful in the winter ; that is, without making a new hotbed for them, but renewing the soil on an old one. Heat is unnecessary to raise them, but may be applied with advantage in the winter by means of fresh lining. Cauliflowers are often sown in a frame, to save them from birds, &c. ; but it is necessary to uncover them as soon as the seed is up, to prevent a spindling growth. It is advisable to look forward to the winter, and sow everything in time to allow of making sufficient growth before winter.

1617. *Cucumbers,* that have been carefully stopped, trained, and pegged down, will continue in bearing. If mildew appears, sprinkle the leaves, and dust with sulphur; but if very bad, it is better to start new plants. If started on new beds now, they will continue bearing until Christmas, and with care all the winter; but they should be on good 4-foot beds, so that good linings may be applied; for, as the season wanes, and the weather becomes colder, heat must be provided accordingly. Give fruiting plants the benefit of gentle showers.

1618. *Melons.*—The same directions apply to these now as formerly. Where the fruit is swelling, keep up a brisk heat and plenty of moisture; but where it is approaching ripeness, let the beds gradually dry off: also, where fruit is setting, maintain a moderately dry atmosphere, as they do not set well if kept damp at the time.

1619. *Mushrooms.*—To make a bed for a good supply of these in the autumn, it should be done in a shed, or some dry airy place. Let a good quantity of short stable-dung be got under cover, and mix about one-third the quantity of soil with it. Some gardeners disregard this process, but I certainly think it an improvement. Let the mixture be worked backwards and forwards at least a fortnight; if for a longer time, it will be better, for the material cannot be too short; but take care never to lay it together, for the increased pressure causes a rank, fetid smell, which is by all means to be avoided, since it would be destructive to the crop. Never lay it above four feet in height,—rather less than otherwise: when ready, proceed to make the bed in a ridge or conical form. As this gives the greater surface for the crop, beat the dung well in the process, and, when finished, let it remain for a day or two; then ascertain the temperature, either by placing a thermometer in it, or thrusting a stick into it: if, after remaining a day or night, the thermometer should indicate not above 80°, or the stick on withdrawal feels comfortably warm, it is time to spawn it. Much has been said about letting the bed all but cool before spawning,—I have found it best to choose a high rather than low temperature; the spawn sets to work more freely and rapidly, and the mushrooms come up more uniform over the bed. The process of spawning has been already described. It is not advisable to case the bed (that is, putting a case of good fresh loamy soil of about two or three inches in thickness all over it) immediately after spawning; but cover thinly with straw for a day or two, or till the spawn just begins to take hold of the dung; then case it, beating the soil firmly, and, lastly, put on straw enough to exclude the light; and as the weather and the bed cool, increase the covering and add garden-mats. In making mushroom-beds, much depends on the quality of the spawn. Good spawn, which ought to be procured at all nurseries, &c., is full of fine downy-looking threads, and smells exactly like mushrooms: it is sometimes found in plenty in heaps of old manure, that have been several years without being disturbed.

1620. *Corn Salad* sown now in a cold frame will be very useful in winter. It is merely necessary to place 16 inches of earth in the frame, and sowing on that, treading or otherwise matting the surface of the soil firmly. Some young plants of parsley planted on the same depth of soil, six inches apart, will be useful also in winter.

1621. *Mushrooms.*—The mushroom is a vegetable requiring a system of treatment peculiar to itself, and so widely different from that of any other, that those that do not make themselves acquainted with its nature and mode of cultivation, necessarily fail. The first and most important requisite in the cultivation of this plant is good spawn. Spawn of excellent quality may be made in the following manner:—

1622. To one barrow-load of moderately strong loam add two of horse-droppings fresh from the stable, and two of cow-dung (sheep or deer-dung may be used with equal success). Thoroughly mix these in a dry state, then wet and work the mixture to the consistency of mortar, and spread it over a level floor. When it is set sufficiently firm, cut it into bricks about a foot square; place them on edge in an airy situation, but sheltered from wet; when they become tolerably dry, build them into a square heap, placing a piece of spawn on each brick between every layer, and cover the whole with dry litter. The heap will now require attention to prevent its fermenting too strongly. If the thermometer rises above 90°, the litter must be removed, the heap flattened and re-covered. Should fermentation not take place sufficiently for the working of the spawn, more litter must be added; too much attention cannot be given at this crisis of spawn-making. If the spawn does not run freely through the whole mass until it becomes of a whitish appearance, it will be of inferior quality; but if it passes this state, and, upon breaking the bricks, long filaments or threads are found, it will be almost useless for the purpose of reproduction. The spring is the best time for this process, as it is easier to raise the temperature than to depress it, and a better opportunity of drying the spawn is gained, which is a matter of vital importance in keeping it for any length of time; but at the same time it may be attended with success any time between March and September. Spawn well made, properly dried and securely stored, will retain its properties almost any length of time.

1623. Horse-dung is one of the chief, if not the most ready, of all manures for the generation of natural spawn, and when properly managed, no manure equals it for this purpose. As it is generally used, or rather abused, a successful result is not so general. The dung is either fermented until it really reaches the state of spit-dung, or it is procured in such condition from exhausted linings, and thrown together in the shape of a bed three or four feet thick, made firm by heading or beating, left for a fortnight or so; then spawned again, left for about the same space of time, when it is earthed over to the thickness of an inch and a half, and covered with litter. If the dung is in that state of dryness and heat which is suitable for the working of the spawn, in due time mushrooms in abundance on the surface of the soil, but few come to perfection. By this time the bed is found rather dry, and a drenching of cold water is given,—a system of treatment as inconsistent with the production of mushrooms as possible.

1624. A few years ago, in an article in the "Gardeners' Magazine," Mr. Barnes, of Birton, endeavoured to show the absurdity of the above plan, and at the same time gave a plan of his own as follows:—"At any season of the year procure fresh horse-dung, divest it of the longest litter, add sufficient soil-loam to prevent excessive fermentation. Make the bed of a substance suitable to the time of the year, and, if possible, under shelter,—say a foot and a half in summer, and from three to four feet in winter; head and beat firmly, and let it rest until a settled temperature of from 80° to 90° is obtained. At that time introduce pieces of spawn about two or three inches square, a foot apart, all over the surface of the bed. It is better that the spawn be in large pieces, as, if the temperature of the bed should accidentally rise so as to burn it, there is a chance of the middle of a large piece being uninjured, while a small piece would be destroyed altogether. Let the bed remain a fortnight or three weeks, then examine the spawn, and if it be running freely, earth it over to the thickness of three inches with good rich loam, and beat it firmly and smoothly down with the back of the spade, and cover with litter to the thickness that the temperature of the bed will indicate as necessary. In about a month, give the whole bed a soaking with boiling water, or nearly so, and water the litter with the same. This will infuse a genial warmth and moisture into the bed peculiarly conducive to the growth of the mushroom, and destroy all insects." Beds made on this principle will become literally a mass of spontaneons spawn.

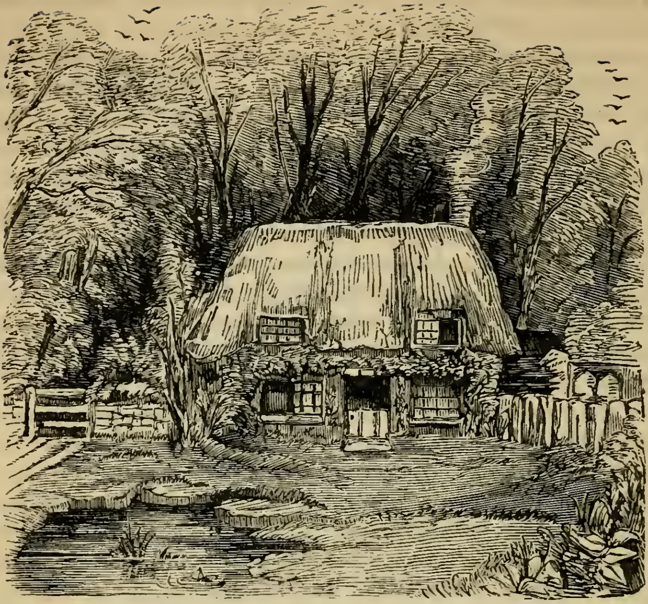
§ 9.—BEE-KEEPING.

1625. A warm corner of the garden, with a south-eastern aspect, will be very conveniently occupied by a few beehives. Bees travel considerable distances for their food, and although objections are raised to the system of changing their locality, it is a very common practice in hilly countries to carry the hives to the hills when the heather is in bloom; for the bees, it is said, give a preference to the pollen produced on dry sterile soils, finding it more aromatic, probably. For the same reason the honey of the most fertile countries is not the most prized; for instance, the plains of Champagne, by no means rich except in the produce of their vines, are remarkable for their honey; none being more prized than that of Narbonne, and the country round Corbières. The honey of Hymettus, a range of low limestone hills, with a sterile stunted vegetation, is also renowned in classic lore.

1626. We have already pointed out the value of the bar-hive, and the system which it involves, and the reader may be interested in learning the nature of the bars which distinguish the hive. This hive, in its most complete form, consists of three boxes sufficiently strong to resist the weather, and well put together; the stock-box being tho bottom one; a centre box which is placed directly over the other, and the super-box; all being of equal size, and fitting into each other. The first and second box have a loose centre-board, in fact, a sort of grating, for a top; the third box is not so deep as the others, and has a solid top. The light loose bars, which are fitted in the loose under-surface of the top, are the parallel foundations on which the combs are to be worked, the underside of the bars being prepared by spreading wax over them, clean worker-comb being reserved for the purpose. The manner in which this is done is thus described by Mr. Golding:—"Having heated a flat-iron, and inverted it on a table between two bricks, quite level, he melts a bit of beeswax upon it, and then draws the centre of his bar, which should be warm, across the liquid wax, to acquire a thin layer of that substance on its surface, and instantly taking the piece of cane, dipping the edge in the same liquid wax, presses it gently on the surface of the bar. Some pieces of clean worker-comb should be annually preserved for this purpose, and kept entirely free from dust or moths. When used, they must be nicely cut and their original dependence preserved, that the cells may dip in the right direction: they need not be more than two inches in diameter. Bars, which have been used, should not be cleared of propolis or sound wax, if it has been the foundation of a comb correctly attached." Propolis in particular is highly agreeable to bees. The easy removal of loaded side-combs for obtaining occasionally whatever honey the bees can spare, is one advantage of hives surmounted with loose bars; they have also another and an important one, especially to the storified or collateral hives. "Mr. Harman," says Dr. Bevan, "noticed, some years ago, to Mr. Golding, the occasional superabundance of large-celled combs in those hives or boxes which have been storified late in the season. I have myself several times observed this, sometimes early in the season,—as early as April; sometimes even in single hiving. This state of the beehive, in the case of doubled stocks, is probably owing to the doubling having taken place when the queen is about to lay drone eggs, and when there is an instinctive disposition in the bees to provide against such laying. It may also arise, especially in single hiving, from the combs being built when there is a plentiful honey harvest, the cells being made to hold the greatest quantity in a given space, and cause the least expenditure of work and materials. In such a season, where there is ample room provided, the proportion of drone-camps will amount to one-half or more. Indeed, these honey-cells, whatever their diameter, have sometimes a great depth. I have often had combs 2½ inches thick, and sometimes find the cells on one side 1¾ deep, whilst those on the converse side are of the usual depth. It is remarkable, whatever be the depth of the honey-cells, their diameter is always the same as the drones or workers, except in particular cases, such as the forming of transition-cells. However advantageous the large cells may be for storing honey, they would, if left in stock-hives, prove very prejudicial to the apiary's success. For want of attention to this subject, bee-masters must sometimes have found the products of their apiaries perplexingly uncertain, and will at once see the importance of the remedy proposed, *i.e.*, the removal of as many bars as are necessary, and the substitution of others furnished with worker-comb."

1627. This is the season when honey should be taken from the hive; but it should be taken with caution ; the stock should be left with not less than twenty pounds, otherwise they must be fed or lost. When the stocks ar weak, of course no honey can be spared.

1628. At the end of August begin to prepare for taking up extra hives, ascertain which of the hives are strongest and healthiest, for these only should be kept. Activity in carrying in pollen, vigorous blowing at the entrance, irritability on tapping at the hive, a sweet and luscious odour issuing from the entrance, resentment of the attacks of strange insects, are all signs of health and strength. Where such signs do not exist, most likely the stock is weak or the queen has died without having a successor ; such hives should not be kept but joined to better ones. About this time the services of the drones are no longer required, and as their consumption of food is considerable, the bees proceed to eject them from the hives, and when once out they soon perish. The numbers lying about frequently alarm the inexperienced bee-keeper, who fancies that a sudden destruction has come upon his hive.



CHAPTER XXIX.

ON HARVESTING SOILS AND COMPOSTS.

1629. Plants derive the chief part of their food from the soil, and as the growth of different species of plants is promoted by certain substances taken up in different proportions from it, which requires to be replaced in order to reproduce the same crop, it is obvious that this renovation of the soil is a very important part of gardening, as it is of cultivation on a greater scale. Much discrimination and judgment is therefore required in the preparation of composts and arrangement of the manure-heap. A rough analysis of natural soils usually presents a per-centage of silica, oxide of iron, alumina, potash, and other substances, which enter into their composition with certain organic matters, to which they owe much of their fertility. The organic matter is of a very complex character, and owes its origin in a great degree to vegetable remains, as the roots and stems of former crops; but also, in part, to decayed animal remains, both of which are found to decompose under the influence of water, air, and heat, producing a blackish-brown powdery substance on analysis, known as *humus*,—a substance which includes a great many vegetable acids in its composition.

1630. "The opinion of chemists is much divided," Dr. Scoffern remarks, in his recently-published work on the "Chemistry of Soils,"* "as to whether the humic acid bodies, when dissolved, are actually absorbed by plants, as nourishment in that condition, or whether complete decomposition into gaseous elements must be the preparatory step to their appropriation. In either case the alkalies must be efficacious, for the solvent action which they exercise advances by one degree at least their final decomposition.

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* Handy Book of the Chemistry of Soils. By J. Scoffern, M.B. Bell & Daldy.

1631. "That some important function of these bodies is intimately associated with their extreme avidity for alkalies, especially for ammonia, can scarcely be doubted. So great is their tendency to unite with it that it is exceedingly difficult to procure acids of this series free from it. Not only do they absorb all of this alkali they come in contact with, but it is suspected that they actually, like many other porous bodies, promote the combination of oxygen and hydrogen, and form ammonia,—a beautiful provision of nature, by which the products of natural decomposition to which vegetables are disposed are endowed with the property of generating that which is necessary to their own solution, and consequently to their assimilation as food; not merely of collecting, but of generating ammonia for their own use."

1632. In order to accomplish this, however, certain elements must be supplied; and all who have examined this question admit that the value of manures is in proportion to the nitrogen or phosphates which they contain, more especially the former; for nitrogen is almost synonymous with ammonia, that being the chief source of nitrogen for plants. "Let the cultivator then," says Dr. Scoffern further on, "take care of his ammonia; let him take care of his phospates; let him prevent the loss of all soluble matters from his compost-heap."

1633. The first and most important source of these elements is farm-yard manure, which, in its fresh state, consists of the refuse of straw, of green vegetable matter, and the excreta of domestic animals. Horse-dung varies in its composition according to the food of the animal, being most valuable when fed upon grain, being then firm in consistence and rich in phosphates. Sheep-litter is a very active manure, and rich in sulphur and nitrogen; "for if a slip of white paper, previously dipped in a solution of lead, be exposed to the fumes of fresh sheep-dung, the paper will be blackened: a sure test of the presence of sulphur."

1634. Cow-litter is cooler, and less rich in nitrogenous or azotized matter; but it is rich in salts of potash and soda, and thus better adapted for delicate and deep-rooted plants. Swine's dung is still less azotized and more watery, and full of vegetable matter,—generally seeds not dead, but ready to germinate; but the most important of all manures is the urine from the stables and drainings of the dung-heap, which is wasted daily to an enormous extent. "The urine of carnivorous animals," says the authority we have already quoted, "is rich in the principles urea and uric acid. In herbivora, hippuric acid takes its place; but in all cases it is rich in nitrogen, and, when allowed to putrefy, ammonia is evolved. Urine is thus one of the most important constituents of farmyard manure."

1635. The composition of manure is a very heterogeneous mixture. It may be broadly viewed as a mixture of humic acid bodies fixed in alkaline salts, and nitrogenous bodies capable of yielding ammonia; and it becomes an important question how is its strength best economized. Some advocate the practice of allowing the compost-heap to be entirely decomposed into an earthy mass,—thus permitting the whole of the ammonia to escape; others have gone so far as not to permit of any fermentation at all, stopping all action by continual turning. "It must be a bad practice," says Dr. Scoffern, "to allow so valuable an agent as ammonia to go to waste; and this is the inevitable result of permitting manure to undergo its last degree of fermentation. In the second place, it is doubtful whether the full and immediate virtues of the manure can be brought into play if it has not been submitted to incipient decomposition." And he goes on to point out expedients for fixing the ammonia and retaining it in all its strength, while it is reduced to a state suited for assimilation as food for plants. It may be absorbed by gypsum or sulphate of lime, which, being cheap, is often mixed with the compost-heap for the purpose; the ammoniacal salts thus formed being afterwards decomposed by the vegetable organism, or by its agency combined with atmospheric influences.

1636. *Leaf-mould* is a substance complex in its nature, and its functions, except so far as its heating properties are concerned, are imperfectly known. The substance of any flowering plant, or leaf, being taken and comminuted by rasping or cutting, and exhausted of its specific secretions by means of solvents, all that remains behind is lignum and cellulose; the components of which are, carbon 24, hydrogen 16, oxygen 16. All bodies of this class yield by slow decomposition results of the highest importance to the cultivation of the soil; when exposed to a sufficient amount of heat, and under the full play of atmospheric air or oxygen, they burn, yielding water and carbonic acid, leaving only a trifling amount of organic matter behind. Natural decay or *eremacausis*, as the chemist term it, is just such a slow combustion of moist organic matter as is required; it is decomposed when freely exposed to the oxygen of the air by slow burning, and the elements dissipated in gradually evolved gaseous combinations.* The result is, that the gaseous fumes are given off, and a blackish-looking mass remains, consisting of bodies of the humic acid series. When reduced to this state, they are, to all physical appearance, like dark-brown soil, or earth; and it is to their presence that garden-soils owe their peculiar colour. On ultimate analysis, these brownish bodies are found to consist of humic, ulmic, and leic acids, and a substance called humine; neither of them soluble in water, but all soluble in alkalies, with which they have a strong affinity. Hence their tendency to unite in the ammonia, and their value as manures in connection with alkali. "Not only do they absorb such of this alkali as they come in contact with," says Dr. Scoffern, "but it is suspected that they actually, like many other porous bodies, promote the combination of oxygen and hydrogen, and *form* ammonia by catalytic agency,—a term used by Berzelius to express the result of the contact of a third body upon two others, without being itself changed in its character,—a beautiful provision of nature, by which the products of natural decomposition are endowed with the properties necessary to render them fit for assimilation as food for vegetables."* These remarks will show how important it is that not a leaf should be suffered to run to waste, but should be swept up as they fall, and conveyed to a heap, taking care to keep them by themselves, and apart from other manures, until they are in a state fit for mixing into composts.

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* Handy-Book of the Chemistry of Soils, p. 101.

1637. The manner in which these influences operate is an interesting subject to the gardener.

1638. The fertilizing properties of manure being in proportion to the nitrogen or azote contained in it, and this gas being absorbed by plants, in combination with hydrogen in the form of ammonia,—and the atmosphere, after the sources we have described are exhausted, being another source from which plants derive this substance, the great utility of trenching becomes evident, especially to those plants which easily give off their azote to mix in the atmosphere rather than in the soil. Leguminous plants are valuable in this respect, for it enables the cultivator to enrich the ground which has been exhausted by excessive cropping.

1639. The cause of the atmosphere holding ammonia sufficient for the development of plants is the decomposition of organized bodies, which all contain a greater or less quantity of azote; but it is particularly in the bodies of animals that this agent exists. It enters into the composition of all their organs, and when, after death, animals are left to the chemical action of nature, all the elements of which they were constituted are separated, and immediately form new, and for the greater part, gaseous compounds, and amongst them ammonia, which is dissolved in the atmosphere by the water with which the air is always charged.

1640. Another source of this agent, as we learn from a writer in the *Revue Horticole*, is in the electric discharges in a thunderstorm. Carbonate of ammonia, according to Boussingault and Liebig, pre-exists in all organized beings. "The phenomenon of the constancy of thunderstorms," M. Boussingault says, "would seem to justify this opinion. It is said, indeed, that every time a series of electric flashes pass in the humid atmosphere, there is a production and combination of nitric acid and ammonia; the nitrate of ammonia, besides, always accompanies the rain which falls in a thunderstorm; but this acid being fixed in its nature, cannot be maintained in a state of vapour. When we consider the reaction which takes place between the different compounds in question, it may easily be conceived that the nitrate of ammonia, which is drawn to the earth by the rain, and which comes in contact with the rocks or calcareous soil, is afterwards volatilized to the state of carbonate at the next drying of the soil. There can be no doubt at the present day, that the carbonate of ammonia is the most active agent of vegetation, and without which all the others would be useless; but this carbonate is gaseous, and for this reason cannot be employed directly by the cultivator, who, were he to try to create an atmosphere of the carbonate of ammonia under his ground, would spend a great deal of money without obtaining any benefit whatever, since the slightest movement of the air would instantly produce evaporation of this volatile manure."

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* Handy-Book of the Chemistry of Soils.

1641. It thus appears that ammonia, whether in the atmosphere or the soil, is the great source of fertility; but natural soils are themselves of much importance in plant-cultivation. Rich black mould often contains 20 per cent. of its own weight of the organic matter we have described. In peat-earth, the proportions vary from 60 to 70 per cent.; in good garden land, the average amount is 10 to 12 per cent.; and in average soils of the fields, it may be 6 or 7 per cent. Sand in its various phases, from silver to yellow, is an important part of the compost-heap, more for its mechanical than its fertilizing properties, although it forms a constituent of many plants; and clay, besides its stiff, tenacious character, which enables it to sustain the more vigorous vegetable growths, is found to be highly attractive of ammonia; so highly attractive, according to Mr. Way, that an ammoniacal sulphate, or nitrate, or muriate, being filtered through a collection of clay soils, real chemical decomposition resulted, the ammonia being retained, and the associated acid passing into some new state of combination. Pursuing his experiments, Mr. Way finally determined the question by tracing silicates of lime, of soda, and potash among the constituents of clay, which were the absorbing agents in question. It is thus a question of great practical importance that the soils for gardening purposes should not only be judiciously, but carefully harvested. All the care bestowed on a plant in potting and watering is so much labour thrown away if the soil is unsuitable; but if a suitable soil be employed, it is wonderful with what tenacity a plant will cling to existence, even under the most unfavourable circumstances. The sweeter a soil is, that is to say, the more it has been exposed to atmospheric influences, the more suitable it becomes for all horticultural purposes.

1642. Even maiden soil from an upland pasture, where it has been well drained, is materially improved by exposure to atmospheric changes for a few months; while soil from a wet locality should never be used, under any circumstances, until it has been exposed to the varied changes of an English winter; and if it be also exposed for a month or two in summer, it will be much improved. The improvement arises principally from the expulsion of deleterious matter, the decomposition of vegetable substances, and the thorough disintegration of the whole mass. When a soil is very strong and adhesive, it is necessary to expose it in thin layers to the action of frost, removing the frozen part as often as it becomes frozen to a sufficient thickness, and placing it where it can be thoroughly dried. Soil thus prepared will generally be found clear of insects, a matter of considerable importance in the cultivation of choice plants.

1643. Peat should be in layers not more than two inches thick, firm in texture and fibry, the upper surface covered with dwarf heath, and the under surface resting on sand. This will generally be found in upland situations. This, when brought home, should be carefully looked over, divesting the upper surface of all rough herbage, and the lower of every particle of sand; and then placed in ridges, so that the air can act on all parts of it; turning it occasionally until the rains of autumn render it necessary to stack it. If not wanted for use before the following summer, build some turf-pits with it, which may be turned to good account for protecting lettuce or cauliflower-plants, leaving the peat exposed to the action of the weather on all sides, which will much improve its texture and mellow its properties. If not used for that purpose, however, stack it in narrow ridges four feet in height, the base three feet wide, and tapering to a single turf at the top, placing the turves at short distances apart, so as to admit of the air percolating freely among them, and run an air-drain longitudinally through the centre of the stack, or introduce old pea-sticks between each alternate layer of peat, so that the surface-water may be carried away as it falls.

1644. When peat is used without being prepared as described, the outer surface should be charred. The turves should be cut into pieces three inches wide, to allow every part to become equally heated. Loam prepared for immediate use should be charred in the same way; indeed, leaf-mould and composts of all kinds will be materially benefitted, especially when intended for raising small seed, so as to destroy the insects and vegetative power of any seeds they may contain.

1645. Charred cow-dung is an excellent manure for almost all purposes, and by charring it, it is immediately fit for use. Take some old wood and build a cone two or three feet high; then procure some green cow-dung, and cover the cone nine inches thick; let it drain for a day or two; cover it with weeds or rubbish, and set fire to the wood, regulating the draught so as to prevent the fire burning too fiercely; and by the time the wood is consumed, you will have a fine crust of charred cow-dung. To mix, when broken up, with composts, or to place a few pieces at the bottom of the pots in which calceolarias, pelargoniums, cinerarias, or pines or vines are grown, this will be found a most excellent manure.

1646. Grey or silver sand is an indispensable ingredient in all composts for plant-culture. In its purest state, silica or sand is the *débris* of quartz, or rock-crystal, which is composed almost entirely of silica, hard sand being the result of the disintegration and decomposition of rocks by the chemical agency of the atmosphere, assisted by the mechanical powers of the winds, of rain, and abrading waters. It varies much in its composition; oolitic rocks, granite, limestone, and red and green sandstone, all furnishing their quota. As an impalpable powder, it occurs in all soils. In its chemical character silica is an important constituent of organic life, being found, on analysis, in most plants. Mixed with soda, and heated to redness in an iron ladle, silica dissolves to a fused mass: if thrown into water, it will completely dissolve;

and if nitric acid be added, it becomes gelatinous,—indications of the means by which silica is treated in the great alembic of nature, and adapted for absorption into the tissue of plants.

1647. In preparing it for the more obvious mechanical purpose which it serves in plant-culture, sand is divested of the other constituents of the soil, by washing and sifting through a fine sieve. In this way, all soils will yield a portion of this element, and dry; but the best mode of procuring it, is to proceed to some stream running through any of the sandstone countries. In such a stream there are few places where the winding eddies have not formed a sand-bank, and one of these will generally furnish an ample supply.

1648. When thoroughly washed, and all particles of clay extracted, let it be thrown into a heap, sheltered from the rain, and turned until it is thoroughly aërated; it should then be harvested in a dry place till wanted for use. Silica is a constituent of all the grasses, and is absolutely necessary in the cultivation of all those of the family cultivated in our hothouses and gardens: it is also a necessary amelioratorin all clay soils. Its value is therefore beyond calculation to the gardener.

1649. After soils are collected for use, they should not be washed by excessive rains, and for that reason they should be in narrow upright ridges, so as to throw the rain off; and after they have been turned a time or two, it may be necessary to protect them by a slight covering of weather-boarding.

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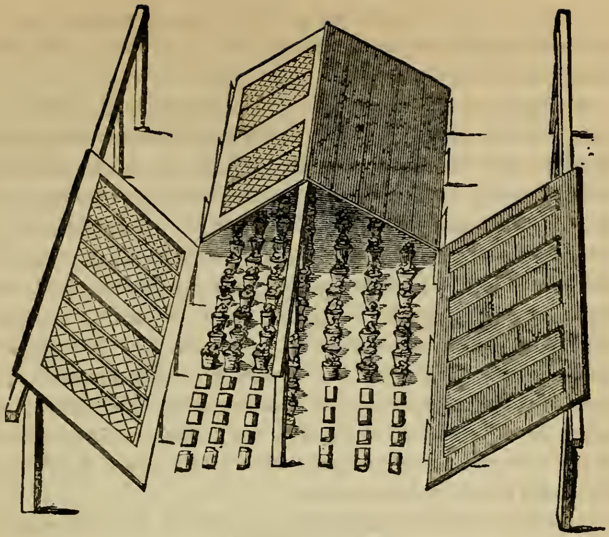

AURICULA STAGE.

CHAPTER XXX.

THE FLORIST-FLOWER GARDEN.

1650. FLORICULTURE assumes to itself the care of a section of our oldest and most charming flowers which it claims as its own ; and truly it has shown itself not unworthy of the charge, for off one flower alone,—the ranunculus, it has established upwards of a thousand named and truly beautiful varieties. The florist's flower-garden comprises, besides the dahlia, hollyhock, and chrysanthemum, which we have treated as autumnal-flowering plants,—I. Tulip ; II. the Polyanthus ; III. Auricula ; IV. Heartsease or Pansy ; V. the Anemone ; VI. Carnation ; VII. Pink ; VIII. Picotee ; IX. Hyacinth. Not satisfied with these old favourites, however, the florist claims all of our new importations which will "sport," as he is pleased to term it, into well-marked varieties. In this manner he has laid violent hands on the rose, the hollyhock, the fuchsia, cinerarias, the geranium, and some others of our most beautiful garden flowers. Not, however, without resistance has he been able to call these gems of the flower-garden his own. Many there are who deny his right to divest the wild and beautiful rose of its graceful habit of growth and its flower of fragrance, with its innumerable folds and volutes as presented by nature ; into a stiff formal florist's flower ; or transform the graceful drooping habit of the fuchsia into a series of circles and mathematical forms. He modestly tells us, however, that all flowering-plants, with certain distinguishing characteristics, come within his domain. These characteristics are—

CONTINUOUS-BLOOMING.—For which scarlet geraniums, verbenas, heliotropes, and calceolarias, are given as examples.

ELEGANCE OF HABIT.—As in the rose, the fuchsia, and many evergreens.

SPLENDOUR OF FLOWER.—As in the pelargoniums, heaths, rhododendrons, azaleas, and kalmias.

FRAGRANCE OF PERFUME.—For which the violet, mignonette, carnation, pinks, hyacinth, and the tea-roses are remarkable examples.

1651. It is a peculiarity of florists' flowers that they soon become subservient to the objects of the cultivator; so that, by following up an imaginary model of excellence, florists have often succeeded in a great degree in attaining the desired form. Thus, one tulip is to have a cuplike form, swelling out in its upper part with a plain flat edge along the tops of the petals, forming the half of a perfect hollow sphere; while another, when quite expanded, has scarcely an indication of a division of the petals, which are six in number, and all marked alike, or it is no true flower. The globose form of the fuchsia is its most desirable shape, the bud before opening, especially, must be globular. The rose should be circular, full in the face, thick and smooth in the petals, very double, and very symmetrical, and very stiff and formal; while the simple lover of flowers is looking for beautiful colour, graceful folds and volutes in the arrangement of the petals, and a free and somewhat roving habit in the plant, and fragrant perfume in the flower itself. Singularly enough, though few or none of these forms of perfection have been quite attained; by growing seedlings from the nearest approach to them, and correcting one, so called, bad feature, by crossing it with others in which it is absent, a wonderful approximation has been secured. The cineraria has been cultivated for the desired form until it has become almost a perfect circle, the petals overlapping each other in that form. The pansy is frequently grown perfectly round, and the verbena is rapidly extending its petals in the same direction under this kind of cultivation.

1652. Florists' flowers are usually planted in formal and rather stiff-looking beds, the flowers in right lines,—those of dwarf habit occupying the outsides of the beds, with the taller sorts in the centre, with conveniences for their protection on sudden emergencies. Where, then, is the FLORIST'S FLOWER-GARDEN to be placed in the general arrangements? Very near to the dwelling of whoever has charge of them if they are much cherished, for no class of plants require greater attention to grow them properly; they require all the air that can possibly be given to them, while a slight frost coming suddenly on after a warm April day—above all, heavy storms of rain, a hailstorm (not unusual this month), or even a boisterous wind—will be destructive to many of them.

1653. Heat is nearly as destructive. They should only meet the morning and evening sun, and a shade of light calico for an hour before and after noon, during the flowering season, will much prolong their bloom. For shelter during the night, it has even been recorded of old and enthusiastic growers, that at this stage of their career, when they have been removed to a snug corner, and placed under hand-glasses, they would take the blankets from their own beds to cover them up and give additional shelter to their favourites when a frosty night was anticipated. Indeed, the writer can vouch for one fit of gout caught in the cause. While the century was yet scarcely out of its teens, he had accepted the hospitality of a suburban house, where he had spent the day, and was roused in the "small hours" by a furious banging of doors and scuffling of feet beneath. The police had not then attained its present efficiency, and the metropolis was yet ringing with comments on a barbarous murder, in which a whole family had been slaughtered on their own hearths; his first idea, therefore, was to rush to the window in order to see how the land lay; there a sight presented itself which increased his astonishment. A fine April day had been suddenly succeeded by a stormy night of wind, hail, and sleet: the window looked into the garden, and the first object which presented itself was a stoutish figure, in night gear, and nothing else, rushing maniacally through the storm, while banging doors below intimated some great commotion. Without wasting much time on the toilette, he was soon below, where the other inmates were rapidly assembling. The master of the house, a retired tradesman who was here enjoying the retreat his industry had earned, had been infected with the floramania; he had got together a very choice collection of auriculas, tulips, and other florists' flowers, which he had been exhibiting with great satisfaction the previous day. He had been roused by the storm, and suddenly recollected that, owing to the mildness of the day, his beloved flowers had not received their usual protection, and were now exposed to the pitiless pelting storm. Without other preparation than that of slipping his naked feet into the "bauchles," as he called the old shoes which did duty for slippers, he had rushed to the rescue, leaving doors ajar, which the wind had taken the liberty of banging in the manner described. A severe attack of rheumatic gout was the consequence to our host.

1654. Let us then advise, by all means, in places where there is a gardener living on the premises, that some spot should be laid aside for the culture of florists' flowers, either close to the house itself, or to the gardener's cottage. No large space need be appropriated, as the flowers, being chiefly planted in beds, occupy little room comparatively, for a costly collection may be planted in the space of a hundred square feet.

1655. It is true "one does not now hear of 20,000 francs (£800) being given for a tulip; nor does the florist of our days deprive himself of his food in order to add to his store of anemones; neither does he pass whole days, ardent as a young lover watching the changing emotions of his mistress, in admiring the colours of a ranunculus, the beauty and fragrance of a hyacinth, or trembling like the aforesaid lover lest a rival should injure the bloom of a favoured auricula." Beckmann also tells us of 4,400 florins (£366) being given for a small bulb of the tulip Admiral Leifkin, weighing something less than a grain, and 2,000 florins for Semper Augustus; while 120 other tulips sold for 9,000 florins—one of them (the Viceroy) bringing 4,203 florins, as they did at Alkmaar in 1637,—the florin, according to the then value of money, representing a bushel of wheat. Compared with the prices which some of the finest bulbs now bring at our public sales, the difference shows the extent to which the floramania was carried in the seventeenth century. Nevertheless, rare bulbs do still bring extraordinary prices so long as they are known to be confined to one or two individual plants; and in our own day we have seen a Fanny Kemble and Polyphemus sold at the rate of 100 guineas for four or five bulbs.

1656. *Florists' Flowers,* as we see them in their present state of cultivation, prove how immense is the field which Nature lays open to reward the industry and intelligence of man. Who can place the different flowers which have passed under the florist's hand for cultivation side by side with their wild originals without being struck with wonder at the almost marvellous results which follow from the ingrafting of nature and art? Compare the pansies of some of our recent prize-shows with the wild heartsease of the woods, and it is hardly possible to realize the idea that the two stand to each other in any sort of genealogical relationship; and the same is true of pinks, and hyacinths, and anemones. Nor, indeed, is the contrast yet at its height, for every year fresh progress is being made in symmetry, in richness and variety of colouring, or in size. Look at the dahlias and chrysanthemums of the present day, and think what were considered good flowers, and actually called forth admiration, some twenty years ago. The different varieties which come under the head of florists' flowers are so rich in beauty that most persons take delight in them. Indeed it is quite impossible for a garden to be really gay without its share of them, and with them any garden may be gay at all seasons, except in the depth of winter. Even now, as we write for the autumn months of the year, though tulips, and carnations, and auriculas, and ranunculus, and hyacinths, &c. &c., are at rest, chrysanthemums and dahlias are in their glory; and these will continue to enliven our gardens till an envying frost cuts them off. At all seasons of the year there is something to be done with florists' flowers. Let us take the chief varieties in order, and see what autumn care and culture are required by them.

1657. *Tulips.*—There is a peculiarity belonging to tulips which does not, so far as we are aware, belong to any other flower. The seedlings, in their first bloom, generally produce flowers without any stripes or markings, all the upright portions of the petal being self-coloured, flowering for years without any such variegations, when they are called breeders. After some years they break out into stripes: if these are liked, they are named; but they have multiplied in the breeder state, and may have been distributed in all directions, each person possessed of one which has broken using the privilege of naming it; hence many, with different synonymes, are one and the same thing. It is another peculiarity that of twenty of a sort in the same bed, scarcely two may come up alike, although good judges can recognize them. These particularities interfere with their cultivation, and, as Mr. Glenny surmises, may be one of the charms of tulip-cultivation.

1658. The perfection of soil for tulip-culture would be three inches of the top of a rich loamy pasture, the turf of which, cleared of wire-worm, grub, and insect, has lain by till thoroughly rotted, and which has been repeatedly turned and picked: the decayed vegetable matter will suffice without other dressing. The tulip-bed should run north and south, with drainage perfect, but without stones or rubbish at the bottom. The bed may be dug out four feet wide and 2 feet 6 inches deep, and the compost previously prepared filled in till it is a few inches above the path, the centre being two inches higher than the sides. All water must be withdrawn from the bottom of the bed: it is not enough to give drainage, unless an outlet is found so as to avoid stagnant water. Giving a few days for the bed to settle, rake all smooth again, leaving the bed three inches above the path. On this the tulips are placed in seven rows across the bed, and six inches apart in the rows. They are pressed in a little; soil is then placed upon them, three inches above the crown of the bulbs, so that the bed being raised in the centre, the middle row will be covered four or five inches. The bulbs are planted, of course, according to their height and colour,—those growing 15 or 18 inches occupying the outside rows; the second rows on each side are those growing two feet, and those growing 2 feet 6 inches occupy the three centre rows. When planted and covered, they may be left until the leaf-buds begin to peep through the ground. Of course the sides of the bed will be protected by edgings either of wood or tiles.

1659. As frost approaches, while giving as much air as possible, they should be protected against it by mats or other shelter, but not longer than is necessary; otherwise they get drawn up weakly. In February they begin to appear, when the ground should be stirred, all lumps broken, and pressed close round the stems. As the spikes begin to open, they form a receptacle for the wet, and the frost must not then be allowed to reach them. When the colours begin to show, in order to protect their bloom, a top-cloth must be provided to shelter them from the sun, taking care that no more air than is absolutely necessary is excluded, the cloth being let down on the sunny side only, and that only when the sun is powerful.

1660. By the end of June the stems have turned brown or yellow; as soon as the leaves begin to decay, the bulbs may be taken up, dried, and stored away in drawers provided for them, which are usually marked in seven compartments, so that each row in the bed occupies a similar place in the drawers.

1661. The best time for planting is the last fortnight in October, or early in November. Tulip-seed may be sown either in spring or autumn, and in the soil already described; it should be saved from the best flowers only, and those grown by themselves, where no inferior pollen can reach them. The small offsets should be planted by themselves and labelled, in similar soil to that already described. Breeders such as we have described may be grown in any soil.

1662. Tulips are divided into Roses, Byblomens, and Bizarres. Roses have a white ground, and crimson, pink, or scarlet markings.

1663. Byblomens are those having a white ground, and purple, lilac, or black markings.

1664. Bizarres have a yellow ground, with any coloured marks that present themselves.

1665. Self-tulips are those which are of one colour, such as white or yellow, showing no inclination to sport into other colours.

1666. *Polyanthus.*—Divide the roots of the best plants intended for preservation. This operation must be performed every year, or the flowers will soon degenerate. Fresh soil and continual division is the only plan with all florists' flowers which give out offsets. The single varieties of polyanthus alone are looked upon as florists' flowers; and as these seed freely, an infinite variety of polyanthuses may be obtained by those who will take the trouble to select and sow seed. Late in autumn is the time for sowing; for moderate sunlight only is required to bring up the seed, and the young plants will not stand the scorching sun of summer. Sow in boxes, or pans well drained, filled with light rich mould. The seed must be very lightly covered,—indeed, it may almost lie upon the surface. The boxes should be placed under glass, and sparingly watered. They require no artificial heat.

1667. *Auriculas.*—These may be propagated by offsets at any time during autumn, but the earlier the better. New auricula borders may be made in October, and old ones should be carefully gone over and renovated. Let it be remembered that the auricula delights in shade, and will not bear excessive moisture. In planting offsets, be careful that the soil is well pressed round the roots. In this respect the young plants will require attention for some time. The more delicate sorts of auriculas will not flourish so well as border plants; but the hardy varieties—the common purple, yellow, and green—form very effective edgings to beds, and even when out of bloom they have a pleasing appearance from the richness of their foliage. Of course offsets will only perpetuate the same varieties. New sorts are to be obtained from seed, which must be raised in a gentle heat, and spring seedlings so raised should now be planted out.

1668. *The Pansy, or Heartsease.*—The common *Viola lutea*, with *Viola grandiflora* and *Viola amœna*, are the joint parents of the many beautiful flowers known to us in these days under the general name of *Pansies.* The history of its cultivation is this:—In the year 1812 there was living, at Walton-on-Thames, the Lady Mary Bennett, daughter of the Earl of Tankerville. The common heartsease was her favourite flower, and a large space in her garden was devoted to the growth of it. Her gardener, Mr. Richardson, with praiseworthy assiduity to please his mistress, selected the best seed each year, and was pleased to find that he could thus obtain some remarkably good varieties. These seedlings were shown by Mr. Richardson to other florists, who became interested in his experiments, and in a few years the culture of the heartsease became popular; it soon took rank among florists' flowers. Pansies require little attention during the autumn months. Indeed, those not intended for propagation may be dug up as soon as flowering is over. The choicer varieties must be taken care of in order that their roots may be divided, or cuttings taken from them in April or May; for it is only by such an annual renewal that degeneration can be prevented.

1669. About the first week in October is a good time to make a selection of plants for potting. These should be vigorous, healthy plants. The bed for their reception may be prepared by digging out the soil for about 18 inches, and filling it up, after providing proper drainage, with compost properly mixed; but a better plan is to make a raised bed for the purpose. This may be done by placing a row of bricks, 18 inches high and four feet wide, or wood, supported by stakes at each end, of the same height, and of a length suited to the number of plants required. This bed should be filled with compost, consisting of well-decomposed turfy mould, leaf-mould, and thoroughly-decomposed cow-dung; or, failing that, stable-manure, in the proportions of a bushel and a half of the first to half a bushel each of the two latter: where the loam is stiff, a little well-washed river-sand should be added; where it is light and sandy, equal parts of earth should be added. Such a raised bed filled with this compost will answer every purpose.

1670. The plants selected, which should be healthy and vigorous, but not too large, plant them in rows 12 inches apart, and protect from frost, which is easily done in the raised bed: occasional examination for their great enemy the wire-worm, and the removal of dead leaves, is all the care they require during winter; in the spring, copious watering, and in summer, mulching, to prevent radiation. The plants may either remain to bloom in the bed, or be used for bedding-out purposes, and the raised bed removed.

1671. *Ranunculus and Anemones.*—These may now be in flower or not, according to the treatment they have met with. They are usually regarded as spring flowers, and most undoubtedly always flower best at that season. In certain soils and situations, however, the tendency to growth and flowering in anemones is such that they have no sooner died down after spring-flowering, than they throw out fresh leaves and flower again in autumn. This, however, is not desirable, for it weakens the tubers, and the flowers soon degenerate. Autumn-flowering may generally be prevented by excluding light and air from the beds, by means of heavy top-dressings of well-rotted manure during the summer months. Many persons take up anemone tubers as soon as the leaf has died down; but this is not necessary, nor is it a good plan, unless the soil of the bed requires renovation, for the tubers will not keep many days out of the ground. We have generally found the finest flowers to be produced the first spring after a new sowing; but soil and situation have always a great effect upon these beautiful flowers. Autumn is the time for ranunculus-planting. Do not let September and October pass away without forming a good bed of them. In early spring these gay flowers will well repay for all the care bestowed upon them. The following appears to be the best mode for planting ranunculus. Let the bed be made of rich garden-loam to the depth of about two feet, with a surface about six inches deep, of a rich mixture of loam, cow-dung well rotted, and leaf-mould. In this plant the tubers in drills about two inches deep, taking care that the claws of the tubers are downwards, and the soil well pressed about them. This depth of drill will allow the crown of the tubers to be about 1½ inch from the surface. Additional protection from frost will consequently be needed, which can easily be managed by covering the beds with old tan or other dry litter, which must be removed as soon as the spring shoots appear. It should be borne in mind that the ranunculus, as soon as it has started, will not bear drought. In dry seasons liquid manure is indispensable; but care must be taken not to injure the foliage in putting it on. Many persons have found the ranunculus hard to cultivate; but if the requisite conditions of autumn-planting be attended to, there can be little difficulty in securing an abundant crop of these gay spring flowers. The cultivation of the anemone is so similar to the ranunculus that it would only be repetition to give it here.

1672. *Carnations, Picotees, and Pinks.*—All layers of these much-admired flowers should be well rooted by October, so that they may be removed from their parent stocks and transplanted either into pots or into beds previously prepared for them. This flower is the cultivated *Dianthus Caryophyllus,* found wild in many parts of England, although it is supposed to have reached this country in its cultivated state from Italy or Germany. Gerarde, writing in 1597, makes mention of it as received from Poland; and it is a remarkable instance of the effects of cultivation, for the named varieties of flakes, bizarres, picotees,—pink, purple, scarlet, and crimson, bear scarcely any resemblance to the original. They are propagated by *seeds,* which, however, do not ripen well with us, and are obtained chiefly from South Germany; by *pipings,* by *cuttings,* and by *layers.* The seed should be sown in May in pots, in soil similar to that recommended for its flowering, placing the pots in an airy, sheltered part of the garden. When the plants are up, and show five or six leaves, plant them out in beds in the same rich soil, and 10 inches or so asunder; protecting them during winter in a cold frame, or by means of matting. Many of them will bloom the following summer.

1673. By layers,—the propagating season being July and August. Having selected the shoot to be layered, and prepared pegs for pegging them down, and soil for their reception, add a little grey sand where the layers are to be placed. Prepare the shoot by trimming off all the leaves with a sharp knife, except five or six at the top; then with a thin-bladed knife make an incision half through the shoot, with an upward cut, beginning below a joint, and passing through it for an inch or so; bend the layer down into the sandy soil prepared for it, pegging it down in that situation in such a manner as to keep the slit or tongue open, and cover it over with rich light compost. Two days afterwards, when the wound is healed, a gentle watering will be beneficial.

1674. *Cuttings* are made by taking off shoots which cannot be conveniently layered, cutting them right through a joint with an oblique angular cut, and planting them in pots or beds prepared with mixed compost and sand.

1675. *Piping* consists in drawing out the young shoots from the joints, and inserting it into a light sandy soil, when it takes root,—a process more generally applicable to pinks than carnations.

1676. In preparing compost for carnations, take two-thirds good staple loamy soil, the turfy top-spit in preference; add to this one-third of thoroughly rotted cow or stable dung, and one measure of drift sand or other sharp grit, to ten measures of the compost. The alluvial deposit from water-courses, like a mill-head, is an excellent substitute for the maiden loam. In preparing the bed for carnations, having filled the bottom with sufficient drainage material, and secured an outfall for the water, fill in the compost till nearly full. On this surface spread out the roots horizontally, and fill up with fresh compost, pressing the whole firmly, but gently down, in that position.

1677. The layers of carnations and picotees should be taken off as they begin to form fibre, and either potted or planted in a nursery-bed till October, in either case keeping them in a close frame till they have rooted. If potted, re-pot in October, and prune in either case to a clean stem, leaving the lower pair of leaves half an inch from the soil, removing all laterals over an inch long; most of them will strike in the beginning of October, and bloom strongly the second year, if they do not bloom the first.

1678. The chief distinction between the carnation and picotee is, that the colour of the former is disposed in unequal stripes, going from the centre to the outer edge; that of the picotee is disposed on the outer edges of the petals, radiating inwards, and uniformly disposed. Flakes are carnations of two colours only, with large stripes going quite through their petals. Bizarres have their colours in variegated irregular spots or stripes. A perfect carnation, to abbreviate Mr. Glenny's description of one, should be not less than two inches and a half across; the lower petals six in number,—broad, thick, and smooth, and lying over each other so as to form a circle; each row of petals smaller than that immediately under it, rising in the centre so as to form half a ball. The colour should be clear and perfectly defined; and where there are two colours, the contrast should be bold and decided.

1679. The preparation of carnations and picotees for exhibition is quite an art, and to some a mystery. The base of the petals, which are mere threads issuing from the calyx, supports broad heavy blades, which form the expanded blossoms; the largest-sized, which should be outside, being frequently in the centre. If the flower were left to itself, the calyx would probably be split all the way down one side, the other side not opening at all. To counteract this tendency, it is necessary to tie the calyx round the middle when the bud is nearly full grown, and before it splits; and when the bud begins to open at the top, to pull back the five pieces which form the outer leaves of the calyx down to the point where it is tied: this enables the petals to develop themselves properly.

1680. It is necessary, moreover, that these petals should be "dressed" to make them presentable. This is done by bringing all the petals into their proper places, passing the threads of the broadest petals outside those of the smaller, and guiding the others to the centre according to their size. This is obviously a very delicate operation, and should be commenced as soon as the petals begin to develop themselves. The larger petals are to be placed outside, and should form a complete circle; the next largest follow, making an inner circle, each petal lapping over the centre of that on which it rests; the third row being placed on the joinings of the second, and a fourth row, should there be one, on the joints of the third; while the whole continues to grow and expand, giving a natural effect to this artificial operation of dressing of the flower.

1681. The mode of dressing is to take hold of the broadest part of the petal with a pair of smooth flat tweezers of ivory or bone, and by a gentle twist to bring the base round into the position it is to assume; the whole being usually supported by a card, in which a hole is cut large enough to let the calyx about halfway through, while the petals fall back upon, and are supported by the card, which is circular in shape, to correspond with the expanded flower.

1682. *Pinks.*—A piping, as the grass is called when it is pulled out of the joint in the parent stem, should be struck under a hand-glass, and when well rooted should be planted in a bed, in rows six inches apart, and three inches between the plants: here they should remain till September, when they may be planted in a bed or pots, in a compost thoroughly incorporated, consisting of two-thirds of loam from decayed turf, and one-third well-decomposed cow-dung. If in pots, let them be 48's, having a few crocks in the bottom, and the pot filled with compost. Lift the plants carefully, without breaking the fibres, adjusting the soil so as to place the plant in its proper position, spreading out the roots on the soil, and filling up the pot to the surface. The roots must not be sunk too deep, but the soil on the top must be on a level with the collar of the plant. When gently watered, the pots may be placed in a common garden-frame, and the glass closed for four-and-twenty hours. Throughout the winter the plants give very little trouble, seldom requiring water, but all the air which can be given them. In March they should be repotted in the pots in which they are to bloom, which should be 24's, with an inch at least of crocks for drainage;—the soil as before.

1683. The soil best suited to receive the young plants is a mixture of good hazel-loam, with well-rotted manure from old cucumber or melon frames. This mixture should be made some months before it is required for use, and at the time of planting or potting the layers, a little white sea-sand should be added to the soil. Where layers of carnations and picotees are potted, the best plan appears to be to place them singly into small pots for the winter months. In this way they can be packed closely under common frames in old tan or cinder-ashes. Let the newly-potted layers have all the air possible in fine weather; but if the winter prove severe, it will be necessary to cover the glass with mats, straw, or pea-haum.

1684. Pink pipings properly rooted should be planted out in October, avoiding the old system of shortening the grass. Where seed is required, the decaying petals should be picked off; otherwise cut down the stem.

1685. *Hyacinth.*—When Dr. Clarke, the traveller, visited the gardens of the Sultan at Constantinople, the first thing that attracted his attention was the fragrant odour of the hyacinth, and he soon became aware that an entire garden was appropriated to this favourite flower, in which it poured forth its whole fragrance under the burning sun of Southern Europe. This universal favourite has long been known in our gardens as the wild hyacinth of our woods and shady places, and we have a recollection of hearing a well-known naturalist dilate on the delight he once experienced after a fatiguing ramble over the Grampians, to find himself unexpectedly landed in a sunny glen, surrounded by a little colony of wild hyacinths perfuming the air with their fragrance. The hyacinth is thus widely spread over the world; very different, however, in appearance from Mr. Glenny's *beau ideal,* which requires that the flowers of the double hyacinth should be "thick enough to conceal the stalk, without disturbing the round form of the individual blooms; the truss or spike pyramidal; the pips, or individual flowers, round in the outline, half-round upon the face; the petals uniform and symmetrical." The single varieties should have the corolla reflexed, and in all respects perfect as the double; the petals wide enough to touch and give a round outline to the entire flower. "A few varieties only approach this ideal, but it is thought best," Mr. Glenny adds, "to describe what would be a perfect thing."

1686. Hyacinths are grown in pots made on purpose for them, six inches across and nearly twelve inches deep. In the absence of these, take a 32; fill the pots within four inches of the top with one-half sand and one-half cow-dung rotted into mould; place the bulb in the centre, and press it an inch into the soil; then fill to the brim with the same compost; thus covering the crown three inches. Set the pots out of doors till it is required to push them on. If wanted to bloom in succession, and to begin early, and there is the means of forcing at hand, bring forward a few in November, a few in December, and a few more each successive month. They require no burying in tan, but, the soil being very porous, they require occasional watering.

1687. Hyacinths in glasses should be put in them about October, the glasses filled with rain or river water, and kept in the dark until their fibres shoot forth, protecting them from frost. Change the water every six weeks, filling it up to the bottom of the roots every time: when they begin to grow, keep them in the strongest light, giving as much air as possible. If grown in sand or moss alone, half-fill the vase used with silver-sand, wetted; place the bulb upon that, and fill up the pot with good green moss. The quantity of water required is just sufficient to keep the sand moist. Once in two or three waterings give liquid manure. made by mixing a peck of rotted cow-dung in twelve gallons of water, and allow it to settle, using the clear liquid only. With this stimulant, the plants will come up short, strong, and well-coloured.

1688. Hyacinths in the open ground require a well-drained spot. To form a bed, dig out the soil two feet deep and four feet wide. At the bottom of this trench put six inches of well-decomposed cow-dung; over that a compost of one-half sea-sand, with the salt well washed out, or any other coarse clean sand, in its absence, adding one-half cow-dung thoroughly decomposed. Fill the bed with this compost well mixed, and let it settle a few days; after that level it, and plant the bulbs six inches apart, all over the bed—there will be seven rows,—pressing them into the soil. Over the bulbs put fully three inches of the compost above the crown, and leave them to their fate. With the exception of the centre row, each of the others should be in pairs or complementary colours; for instance, if the centre row be dark blue,—yellow, dark red; light blue,—dark red, yellow, dark blue; those on each side of it should be a pair in harmonious contrast with it; the next also alike; and so on throughout the bed.

1689. The proper season for planting is October, and the operation should take place in dry open weather, in the first half of the month. As soon as they begin to come through the ground, it will be well to cover them with any loose litter at hand. The period of flowering may be retarded by shading them from the sun; but the bulbs are weakened by so doing. As soon as the leaves turn yellow, and die halfway down, the bulbs may be lifted and laid by the heels; that is, laid on their sides in dry sandy soil, to ripen, for a fortnight, when they may be taken up, the leaves screwed off, the roots trimmed off, and the bulbs put into a cool shady place for two or three weeks, when they may be cleared of their loose skin and fibre, and the offsets and all split roots separated from the bulbs.

1690. These offsets and split roots may be treated in the same way as beds of full-grown bulbs for show, planting them closer, and putting the whole of each sort together. As the young plants come into bloom, pick off all the buds but one or two at the top; when they die down, treat them as directed for the beds. In this way the offsets will, in due time, increase to the full size. The beds once made, only require trenching once a year, and the eight inches at the top dressed with a thick layer of thoroughly decomposed cow-dung, sandy loam, very fibrous and soft: the top spit of a pasture-field which has been lying two years in preparation, turned occasionally, and kept free from weeds and exposed to the action of the atmosphere, does excellently in the early stages, mixing it with sand if too stiff naturally. When the roots are well established, add one-third leaf-mould and a little decomposed manure at each shifting, taking care that the drainage is kept open, and giving plenty of water when in full growth.

1691. For seedlings sow the seed in October; when well up, prick out the plants into shallow pans, placing them in a cold pit. In spring, plant out on a north border, prepared with fresh loam as described, nine inches apart: as they come into flower in the blooming season, mark the best sorts, and in September take them up and treat as before directed.

1692. As a general rule, all bulbs flourish best in light rich soils, and they do not like too close contact with fresh manure. The most adhesive clay may be made suitable for their growth by a proper mixture of fine sand and leaf-mould. Select sound bulbs, but do not reject those which are moist and partially unsound; if you are certain that the flowers are worth keeping, cut out the unsound places, dry the surface in the air, and then plant them. The bulbs of hyacinths should be buried about four inches under the surface: about this depth they are generally secure from the effects of frost; but in unusually severe weather, it may be well to cover the bed with a few inches of tan. Always take a dry day for planting, and into every hole, before the bulb is put in, shake a little fresh dry sand to serve as a bed for it. Of course, all tan or other covering must be removed before the bulbs begin to show themselves in spring. Hyacinths grown in pots will be greatly improved by growing three or four roots together: in glasses, of course, only one bulb can be placed. The water used should be clear rain-water, and the vessels should be filled to within a quarter of an inch of the bulb. To promote vegetation they should be set in a closet, cellar, or other dark, cool situation, till they have rooted freely. As soon as this is the case, remove them to moderate light: a close, heated atmosphere is unfavourable to the development of handsome flowers. While in active growth, the glasses should be kept as near the windows in which they are set as possible, and turned occasionally, to preserve the growth upright. The water should not be changed often, unless it becomes unpleasant: add more water as required, so as to keep the surface within a quarter of an inch of the bulb. A very useful stimulant may be given to the bulbs, by dissolving about an ounce of guano in a quart of rain-water, and pouring a teaspoonful of this, about once a fortnight, into each glass; but it is not desirable to give this until the flowers have started.

1693. The most favoured varieties may be gathered from the results of Messrs. Henderson's show of unforced hyacinths in March of the present year, when the Comtesse de la Costa, a deep rose; the Duke of Wellington, a shade lighter; the Groot Voorst, a deep blush; and Regina Victoria, of a waxy peach blossom; and Waterloo, a dark rosy red, were distinguished among many beautiful double reds.

1694. Among the double whites were Laurens Coster, Sir Colin Campbell, Rembrandt: Van Speyk among the double blues and purples. Among the single reds, l'Ame du Cœur, Diebitsch, Sabalskanski, Madame Hodson, Amy, Florence Nightingale, Mrs. Beecher Stowe, Apellis, Cavaignac, Circe, Lina, and Robert Steiger; among the small whites, Grand Vainqueur, Madame Vander Hoop; among the blushes, Dolly Varden, Elfrida, Gigantea, Grande Vidette, and Orondates, clear whites; and Enricus, Argus, Baron von Humboldt, Von Tuyll, Charles Dickens, and Mimosa, among the single blues and purples. Messrs. Henderson find that the double hyacinths do best in pots, in boxes, or in the open ground; single varieties they recommend for glasses, vases, china-bowls, and for early flowering.

1695. *Narcissus.*—September is the time for sowing seed, in order to obtain new varieties of this most interesting class of flowers. For the mode of proceeding we cannot do better than quote the words of Mr. Leeds, of Manchester, who has been one of the most successful amateur cultivators of the narcissus. Mr. Leeds says,—"To obtain good varieties, it is needful, the previous season, to plant the roots of some of each kind in pots, and to bring them into the greenhouse in spring to flower, so as to obtain pollen of the late-flowering kinds to cross with those which otherwise would have passed away before these were in flower. With me the plants always seed best in the open ground.

When the seed-vessels begin to swell, the flower-stems should be carefully tied up, and watched until the seeds turn black; I do not wait until the seed-vessels burst, as many seeds in that case fall to the ground, and are lost, but take them off when mature, with a portion of the stem, which I insert in the earth in a seed-pot, or pan, provided for their reception. I place them in a north aspect, and the seeds, in due season, are shed, as it were, naturally, into the pot of earth. I allow the seeds to harden for a month on the surface before covering them half an inch deep with sandy soil. The soil should be two-thirds pure loam and one-third sharp sand; the drainage composed of rough turfy soil. In October, I plunge the seed-pots in a cold frame facing the south, and the young plants begin to appear in December and throughout the winter, according to their kinds and the mildness of the weather. It is needful, in their earliest stage, to look well after slugs and snails."

1696. *Dahlias.*—These now, in September and October, are in full beauty. They are only half-hardy with us, since they cannot remain out our entire winter. Indeed, they are so susceptible of frost, that its first and mildest attack is sure to spoil them; for this reason, many persons who wish to prolong their flowering, plant dahlias in large pots, which they sink in the open ground as long as there is no fear of frost, and remove to a cool house as soon as November begins. Dahlias, however, do not do well when thus treated; for they love plenty of pure and fresh air, and will not produce their choicest flowers without it. Look well to the plants in autumn, for they have two great enemies to contend against. However, with a little care and attention, they may be rendered tolerably secure. These enemies are wind and earwigs.

1697. As both the foliage and flowers of dahlias are heavy, each separate stem should be tied to a stake fixed firmly into the ground. These stakes, if painted green, may be so managed, with a little contrivance, as hardly to be seen among the foliage. The first blossoms of dahlias often prove to be very imperfect. When such is found to be the case, remove them at once, that the whole strength of the plant may be given to the development of the better-formed buds. Earwigs are especially fond of the flowers of dahlias, and, notwithstanding all his care, frequently cause great disappointment to the grower. They should be trapped or destroyed in any and every way that can be thought of. Perhaps the most effectual mode of getting rid of these troublesome invaders is to hang small pieces of hollow stalk—bean-stalks for instance—among the foliage and along the stems. These will act as refuges for the earwigs, which may be emptied out of them two or three times a day into boiling water, and in this way destroyed. The dahlia has had a large amount of the florist's care and skill bestowed upon it. It is certainly a gay flower in autumn; but whether it is worthy of all the attention it has received, may well be made a question. Dahlia-roots must not be taken out of the ground until the tubers are well ripened,—November is the time. They should then have all mould well shaken from them, and be hung up to dry gradually in any convenient shed or outhouse where there is no fear of frost. Great care is necessary in drying the tubers, for if too rapidly dried and not well ripened, they shrivel up, and will not throw out eyes for next year; and if not dried enough, the young buds mould and fog off. Those who attempt to keep dahlia-roots during winter must remember that they are very susceptible of frost.

1698. *Chrysanthemums.*—Attend to the staking of chrysanthemums, for the wind is as much an enemy to them as it is to the dahlia. A single stake is almost useless. The best plan is to put in three thus:—One firmly driven into the ground parallel with the stem, and two others crossing at an angle of 20°. Tie these stakes well together at the point of junction, and while tying the chrysanthemum round, loop in the stakes at the same time. In this manner, as the plant grows, the stakes become entirely hidden, and the plant itself is secured against the most severe wind. Chrysanthemums, in their present advanced state of culture, are beautiful flowers: admired they would be at any season of the year; but they are especially valuable because they flower so late. They are also kind for cultivation under any state of atmosphere. Perhaps the finest chrysanthemums in the world are those grown in the Temple Gardens in the murky and sooty atmosphere of London; and along the coast, under the influence of salt-breezes, it takes a very severe frost to cut them off. They are gay also, as well from variety of form as of colour. Their very names bespeak their variety. There are chrysanthemums quilled, tasselled, clustered, incurved, ranunculus-flowered, marigold-flowered, and aster-flowered. There are also the tall and the pompones, and named and unnamed varieties of each without number. Every year new specimens are added, eclipsing in novelty, and often in beauty, all that have gone before. See that cuttings and layers are shifted into pots suitable to preserve them during winter.

1699. Florists have largely increased the objects of their care, including Roses, Clarkias, Calceolarias, and many others; but, probably, the present list includes all which can with propriety be so called.

1700. The bed for the reception of auriculas, polyanthuses, carnations, and flowers of similar habit grown in pots, should be placed in an open airy situation, where they can readily receive shelter from rain and shade from a too ardent sun. The bed and stage, which is represented at the head of this chapter, is 12 feet long and six feet wide, and is calculated to hold seven rows of pots, with a space of five inches between each row; this, allowing six inches to each pot, will give seventy-two in the row; but allowing nine inches to each, it will give 350 plants,—a very fair collection for a private gentleman.

1701. This bed is prepared by laying down about six inches of coal-ashes upon the natural soil, over which a platform is made by laying down a flooring of square tiles, closely fitting into each other: over this are laid seven rows of bricks, equidistant from each other; and on these, at regulated distances, the pots are ranged after the operation of potting has been performed in May.

1702. The shelter and shade are provided in the following manner:—A row of strong stakes, sufficiently close together to support a top rail without interfering materially with the pots which occupy the centre of the bed. These stakes should be six feet high, and five inches by four in size, and they should be driven at least 20 inches into the solid soil; the top rail being sufficiently strong to receive and support the shutters. A similar row of stakes, with top rail, are driven on each side of the bed, and about two feet and a half from it. Three inches on each side of the bed is another row of six stakes of equal strength, but only 18 inches above the ground; the top being notched in the form of the letter V.—The use of these stakes will be obvious; they are to receive and support the lower end of the shutters,—the central top rail when closed; and the outside rails are to receive and support them when it is desired to throw them open. The engraving, which is a perspective view of the stage half filled, shows two shutters closed and two open. The opening between the shorter stakes admits abundant ventilation, even when closed.

1703. The shutters, each four yards long and three feet wide, when closed, form a span-roofed pit open at the sides, three posts supporting each shutter. They are made with feather-edged inch-deal, forming a solid frame; the centre may be deal, felt, or any material impervious to heavy rains; if of glass, there should be an arrangement for shading with calico, or some other material, to exclude the sun during the heat of the day; and the frames should be made to lap one over the other at the sides, and to meet at a proper angle at the top, so as to form a ridge.

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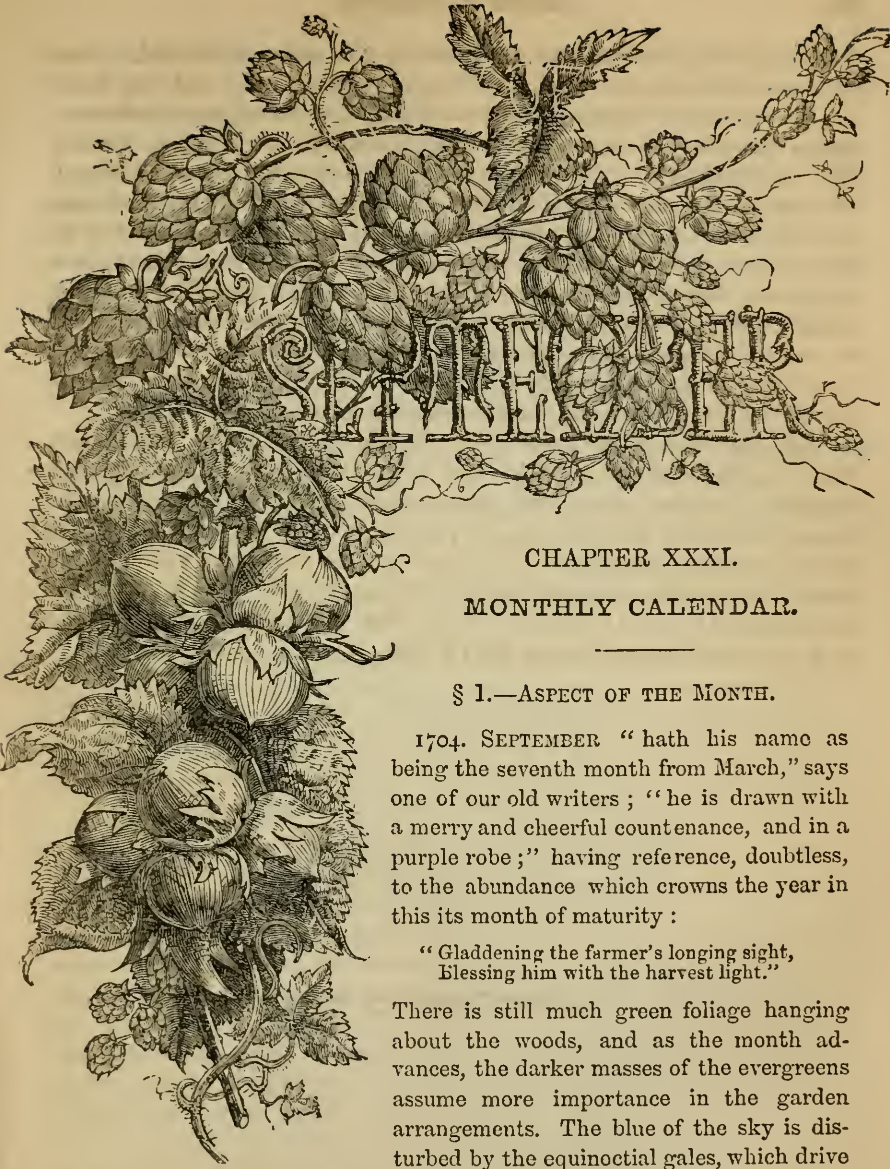

CHAPTER XXXI.

MONTHLY CALENDAR.

§ 1.—ASPECT OF THE MONTH.

1704. SEPTEMBER "hath his name as being the seventh month from March," says one of our old writers; "he is drawn with a merry and cheerful countenance, and in a purple robe;" having reference, doubtless, to the abundance which crowns the year in this its month of maturity:

> "Gladdening the farmer's longing sight,
> Blessing him with the harvest light."

There is still much green foliage hanging about the woods, and as the month advances, the darker masses of the evergreens assume more importance in the garden arrangements. The blue of the sky is disturbed by the equinoctial gales, which drive the white clouds careering before them; but the mid-day sun still retains much of its ardour. A few fallen leaves are rustling in the glades of the forest, but the smaller leaves of secondary growth still retain their freshness; and the woods are now beautiful in their variegated foliage of bright green and russet-brown. The colours which distinguish the foliage of different trees in autumn are among the most striking phenomena of the vegetable world; for it is observable, that one distinct tone of colour is common to the autumnal leaves of all of the same species. Those of the oak change, in this season, to a yellowish green; the plane-tree becomes tawny; those of the sycamore dark brown; the elms take an orange hue; the leaves of the hornbeam assume a bright yellow tint; the cherry becomes red, and those of the beech are dark green tending to deep orange. The oak, mellowed to a bronzed green, thus blends with the faded yellow of the palmated chestnut-leaves and the deeper hues of the elm, while the darker shadows of the pines are relieved by the lighter tints of the fresh leaves and green underwood. Beautifully as they are now blended, however, they are contemplated with a feeling allied to sadness:—

"Are there not voices in the autumn gale,
Whispering sad tales of the decaying year?
Strange mournful tones which summer joys bewail,
Sighs for its fragrant breath,—its heavens clear?"

Over the hedgerow trails the rambling briony, the "wild bramble of the brake," and the wild rose, some of its fruit becoming tipped with scarlet, mingles with the blackberry, the hawthorn, and the convolvulus,—a morning flower, which opens its trumpet-shaped blossom to the morning sun, closing it again with the closing day.

1705. In many places spiders' webs are suspended from plant to plant, and from branch to branch, sometimes two or three webs thick, one over the other; at other times floating in the air in huge flakes, much to the surprise of the spectator, who is full of wonder both as to their object and the manner in which the feat of attaching their extremities to the branches was accomplished,—not to speak of the geometrically-exact pattern of the web, which always must remain an object of intense interest to the observer.

1706. Beautiful are the old English orchards in this month:—

"With ruddy fruit the orchard now is hung;
The golden hop droops pendent in the breeze;
For Autumn from her ample hand hath thrown
Her richest treasures on the laden trees."

The heavy fruit bows down the branches of the trees, and tells of a summer departed. Their gnarled and twisted branches and lichen-covered stems are not always indicative of good cultivation, however, any more than the trim and well-regulated fruit-tree forms a picturesque object in the landscape, or adds greatly to the pictorial beauty of the scene. A verdant sward of deepest green, which the shade of the trees keeps moist and fresh all the year round, receives the earlier-ripened waifs and strays, as well as those whose tender lives the "worm i' the bud" has undermined.

1707. In the flower-garden, if the full measure of colour remains, the fragrance of summer is gone. Most of the flowers of August continue to bloom through September; but their number is gradually less as the month advances. The scentless hollyhocks, dahlias, China-asters, and other autumnal-blooming flowers, take the place of the aromatic and fragrant pinks, carnations, and sweet violets;—

In colour those, and these delight the smell;"

although the tea-scented and perpetual roses still remain to perfume the air with their fragrance, and along with them some very old-fashioned favourites. The arbutus, or strawberry-tree, the most ornamental of autumn-flowering shrubs, it remains to add to our Christmas enjoyments, when it shows itself in fruit and flower at the same time. The hydrangea also exhibits its rich clusters of pink and purplish rose-coloured flowers; for we are not aware that the desiderated blue hydrangea has yet responded to the florist's efforts. The gentians also are very old favourites, and are rich in the luxuriance of their second bloom in September;—

> "Flowers which fringe the Alpine glaciers,
> But they never take the hue
> Of the ice-field or the snow-flake,—
> Theirs is the heaven's own blue."

1708. The reduction of temperature begins to be felt this month, less, however, by night than by day, the mean temperature of the air being 66·14°; one foot below the surface, 57·54°; and two feet, 57·89°; being, from this month till April, warmer at two feet than at one foot. The average fall of rain is also increased considerably, falling more in the night than in the day. It abounds, however, in delicious autumnal days, when the air, the sky, and the earth seem lulled into universal calm,—softer and milder even than in May. The harvest-moon—

> "With broad-expanded face receives
> The western sun's departing rays,
> And back returns the full-orb'd blaze."

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§ 2.—FLOWER-GARDEN AND SHRUBBERY.

1709. Now that the beds are thoroughly covered, nothing contributes more to that high style of keeping that constitutes the chief charm of every garden than the removal of every dead flower and leaf as fast as it appears; the maintenance of neat edgings, and sharply-defined lines of coloured or ribbon borders, or beds planted on the ring principle. Generally, it would be bad taste, except in beds planted on the pincushion system, to allow one colour to run into the other. There are, however, exceptions to this rule, and two of the most effective rows on a ribbon border that I have ever seen were the variegated alyssums and Purple King verbena allowed to blend and intermix at their point of union.

1710. Regularity of height is also another desideratum too, and proof of high keeping. Not that every bed, or every part of a bed, should be of one dead uniform height, but they should either present a level or an even surface. Suppose, for instance, a bed is raised in the middle, as a rule it should gradually fall towards the sides, and the same parts of the bed should be of the same height. If the edging is six inches high, it should be this height all round; if the second row is nine inches, it should be nine inches throughout, and so on. Nothing is more indicative of a want of judgment in planting or slovenly keeping than a row or bed six inches here, twelve there, and ten at another point, without regular gradation, or any system whatever. Only of secondary importance to the blending of proper colours is the arrangement of plants according to their proper heights. Of course the appearance of a weed, great or small, on either beds or ground, is an intolerable intrusion upon, and quite inconsistent with, high keeping. Closely-strewn well-rolled turf is like the picture-frame's influence upon the picture, and has a powerful influence in exhibiting beauty in the best light. In harmony with all this the walks must be scrupulously clean, hard, smooth, and bright, to afford pleasant facility of access to, and be in character with, the beauty of the objects they are designed to exhibit.

1711. Having thus provided, regulated, arranged, and enjoyed the highest amount of beauty that the garden is capable of yielding, the next point is how all this is to be perpetuated or reproduced another season. This brings us to another great business of the month,—Propagation. All trimmings of verbenas, ageratums, geraniums, calceolarias, &c. &c., that are cut off to maintain sharp lines, clearly-defined edgings, &c., must be inserted as cuttings. Where enough cannot be thus secured, the thickest parts of lines or beds must be thinned for this purpose; or, better still, plants that were placed in the reserve-garden for this object must be cut down and divided into small morsels for cuttings. A cutting is simply a part of a branch with two or more joints, leaves, or buds: it must have two joints to constitute a cutting. It may grow if it has only one, but then it is called an eye. Generally, cuttings have from three to six joints or leaves: these are enough for a verbena; four to six are good averages for scarlet geraniums. Cut the base of the cuttings clean across with a knife; remove the leaves at the base, or not, as you please; insert it firmly in any light sandy soil, covering the surface with fine sand, the more effectually to exclude the air; place it in a position favourable to the retention of its juice until roots are emitted, and then the period of its cuttinghood is over, and it has become a perfect plant. For cuttings of most flower-garden plants at this season no place is so good as a close cold frame. In preparing pots or pans for cuttings at this period of the year, it should first be determined whether they are to remain in store-pots for the winter, or be potted off as soon as rooted. If the former, a third of the pot should be filled with drainage; if the latter, a much smaller proportion of drainage will suffice. Cuttings that are to stand in their store-pots until next spring must also be inserted thinner than those that are to be potted when rooted. Ten verbenas, or other such cuttings, will be enough for a 48-sized pot to maintain throughout the winter. Twenty might be inserted if they are to be potted off directly. Some cuttings, such as scarlet geraniums, have, however, a superabundance of sap when removed from the parent plant; if placed in the same medium that would suit the tip end of a verbena-shoot, instead of forming roots they would decay by wholesale. Various expedients have been recommended to check this tendency—laying the cuttings in the air after they are made, to dissipate their superfluous juices, &c. &c. No practice is, however, so good as removing the cuttings direct from the plants, with all their leaves on, and placing them full in the sun out of doors without any shade or protection whatever. They may either be planted in the natural ground, six inches apart, on a prepared border, or in pots or boxes; and success will be alike certain, with less than one per cent. loss. I will describe the details of my own practice next month.

1712. Dahlias will now require careful tying, disbudding, and thinning of the shoots, where first-rate flowers are required; a good soaking of manure-water in dry weather will also be most serviceable to them. The blooms of hollyhocks may be much prolonged by similar treatment. Every offset of the best varieties ought to be inserted as cuttings, and previously-rooted cuttings of hollyhocks planted in the reserve-garden.

1713. *Roses.*—Perpetuals may still be cut back with the hope of a third bloom; and late-budded plants will require looking after, watering, and training to stakes.

1714. Pot off layers of carnations as fast as rooted, water sparingly, and place in a cold frame for a few days until they make a fresh start.

1715. Plant out in beds early-rooted pansy-cuttings, insert a succession of cutttings, and prick out seedlings in the reserve-garden. Here also let seedling polyanthuses, offsets of these and auriculas, be planted on rich shady beds. Stocks sown in pans, or in the reserve-garden, in August, will now be fit either to pot off and place in frames until established, or to prick out on shady beds in this department. The first sowing of hardy annuals to stand the winter in the open air should also be made towards the end of the month. Prepare beds for and plant out pinks for next year's blooming; hunt for and destroy earwigs on dahlias, hollyhocks, &c., and see that everything is being prepared by a season of healthy growth to meet the trials and storms of winter, as well as to add to the loveliness and increase the glory of this delightful autumnal month.—D. T. F.

§ 3.—HARMONIOUS COLOURING IN FLOWER-BEDS.

1716. "Softness without melancholy, and brilliance without glare," is Foster's eloquent definition of a summer's morning. Such would also be an appropriate description of a well-managed and properly-grouped flower-garden. For the last few months, a perfect deluge of beauty has been sweeping its enchanting course over the surface of the world. No one can help being amazed at the power which could thus, in a few weeks, by means which none can perfectly understand, enwrap the universe in a rich robe of varied glory. All the endless varieties of soil and climate,—from the regions of frigid snow to those of burning sands,—have their own peculiar vegetation, staining the snow with a blood-red colour, or relieving the arid waste with a sprig of green moss. But while the whole earth is more or less covered with beauty, each garden should be a focus, concentrating into one ardent beam ten thousand convergent rays,—not, however, to dazzle by their brightness, offend by their gaudiness, nor puzzle and perplex by their inexplicable kaleidoscopic-like confusion; but to satisfy by their intrinsic beauty, please by their charming variety, and tranquillize by their harmonious congruity.

1717. To have a well-formed and nicely-filled garden is not enough,—it must also be nicely arranged. Nay, the latter is even of much more importance than the former. I yield to no one in admiration of beauty of form. It is of the first importance that the outline of the beds, and their relation to each other, should be good; but it is of much greater importance that the colours with which they are filled should either harmonize or contrast with each other. It is much easier to learn this by actual observation in the garden than anywhere else; and this is also the very best month in the whole year to study the theory of effective grouping as illustrated by actual practice. Every one who has the opportunity should visit the best garden to which he can gain access,—pencil in hand. Those combinations of colours that strike you as most effective should be carefully noted down, as well as those which are not effective: the former entered as examples to be imitated; the latter, as warnings to be shunned. Try also to engage in conversation with the gardeners where you visit, and draw out their reasons for certain combinations. They are generally so generous and good-natured, that in ninety-nine cases out of a hundred they will give you, with free good-will, information in a few minutes that it has taken them years to acquire.

1718. Supposing that some of our readers may not have access to any large gardens, they may all go to the best garden in the country——Kensington? No.—Crystal Palace? No; although they manage these matters well at both.—Do you give it up? Yes——Covent-Garden market! By studying the bouquets in the windows there, imagining every compartment a separate flower-bed,—the whole bouquet a complete flower-garden,—and the edging a fringing of evergreen shrubs around the garden, to soften and tone down the effect of the brilliant colours,—you may acquire a thorough knowledge, if not a complete mastery, of the art of arranging colours most effectively. Bouquets, thus arranged in zones of colour, are equally as instructive as those that are divided transversely into four, six, or eight compartments. It is only necessary to enlarge the scale; mentally transfer it to the ground, and carefully observe the effect of various hues in certain relative positions to each other. After exhausting these two modes of learning by example,—or, in their absence, then something, perhaps a great deal, may be learned from a work of this description.

1719. The whole principle of effective grouping is based upon the fact, that all colours are more or less beautiful when placed in a certain relationship to other colours. Flowers are very much influenced by their neighbours. It is not good for them to be alone; but better, infinitely better, to be alone than in bad company: good congenial society brings out their best qualities. All colours are strengthened and improved by harmonious contrast and congruous blending together. Certain flowers, when placed contiguously, appear to intensify each other's depth; others equally beautiful in themselves, lessen or destroy each other's beauty when placed in juxtaposition. Hence has arisen the necessity of blending and arranging colours upon some generally-received philosophic principle.

1720. The effective disposition of masses of colour has long constituted the chief art of painting. Now, making every exception arising from the nature of the case, the same arrangement of colours that is pleasing and effective in a landscape *on canvas,* would be equally so in a garden. The painter has a decided advantage in having entire control over his materials; but the object aimed at in both cases is identical; viz., so to arrange, contrast, blend, and harmonize differing hues and shades of colour so as to produce a maximum amount of beauty. However, *disturbing* causes are so numerous in gardening, that there is a certain amount of truth in Mr. Repton's remark, that "a beautiful garden is not more defective because it would not look well on canvas, than a didactic poem would be because it neither furnishes a subject for the painter or musician."

1721. The nature of the ground, shape of the beds, style of the garden, character of the surrounding trees and shrubs, extent and size, all exert an influence upon the proper quality and quantity of *colour* to be *introduced.* The character, habit, and time of flowering of the plants used, are also points of the utmost moment, and the best arrangements are often marred from inattention to these *minutiæ.* I will now lay down a few elementary principles, and give some examples of effective arrangements.

1722. It is well known that there are only three primary or simple colours,—red, yellow, and blue,—and they are most effective when placed in the order in which I have named them. But if a wafer of either of these colours be placed on a sheet of white paper, it will appear in a few minutes to be surrounded with a ring of a different colour; and the colour thus formed is called a secondary, compound, or complementary colour, and always looks well placed in juxtaposition with the primary colour producing it. For instance, place a red wafer as indicated, it will appear surrounded with a circle of green; a blue, the circle will be orange; a yellow, the border will be purple: therefore purple, orange, and green are the complementary colours of yellow, blue, and red, and always look well placed beside them. Orange is also complementary to blue, greenish yellow to violet, indigo to orange-yellow, and, of course, *vice versâ.*

1723. In practice white generally takes the place of green, a green bed seldom or never being admissible, except in scroll-work, or in a very small bed on bright red gravel. Mr. D. R. Hay observes,* that these contrasting colours to the primaries produce harmony in opposition, in the same manner in which it is effected in music by accompaniment,—the orange with the blue, the purple with the yellow, and the green with the red. This neutralizing or compensating power is the foundation of all agreement and harmony amongst colours; and upon it depend the brilliance and force of every conception. From the combination of these secondaries arise the three tertiary colours,—olive from the mixture of purple and green; citron from the mixture of green and orange; and russet from the mixture of orange and purple. These tertiaries, however, stand in the same relation to the secondaries as the secondaries do to the primaries,—olive to orange, citron to purple, and russet to green.

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* Laws of Harmonizing Colouring. W. Blackwood & Sons.

1724. Dr. Lindley, in commenting on Mr. Chevreul's work on colour, remarks: "As to contrast of colour, it is found by experiment, and it may also be proved by *à priori* reasoning, that whenever the eye regards two or more different colours at one and the same time, the colour of each is so modified, that it appears, by the contrast, to be of that colour which would be produced by the addition of itself to the complementary colours of its neighbours; and this modification is greatest where the contrast is strongest, and least where that is the weakest." When colours that are as nearly as possible complementary to each other are contrasted," the colour of each is rendered more intense, or its tone is deepened. This follows immediately from the general principle laid down, and is fully confirmed by experiment. Colours, when contrasted with white, are deepened in tone, and at the same time appear more brilliant; the white itself being tinged slightly with the complementary of the contrasted colour. Contrasted with black, colours appear of a higher tone, or less intense; and the black is feebly tinged with the complementary of the contrasted colour: grey, being intermediate between black and white, produces an intermediate effect on colours with which it is contrasted. This is seen in the following results, obtained by placing different colours in contact with a grey ground:—

Red and Grey.—The grey appears greenish, in consequence of its receiving the complementary of the red; the red appears purer,—less orange-colour, perhaps.

Orange and Grey.—The grey appears bluish; the orange purer, more brilliant, and, perhaps, a little yellower.

Yellow and Grey.—The grey is tinged violet; the yellow appears more brilliant, and at the same time less green.

Green and Grey.—The grey is reddish, and the green is more brilliant, perhaps yellower.

Blue and Grey.—The grey is tinged with orange; the blue appears more brilliant, and a little greenish.

Indigo and Grey.—As the last.

Violet and Grey.—The grey becomes yellowish; the violet purer, and les dull.

1725. When two compound colours, having one and the same simple colour common to them both, are contrasted, the common colour loses its effect in a greater or less degree. For example, take orange (composed of yellow and red) and green (composed of yellow and blue); their common colour (yellow) being lost by the contrast, the orange appears redder, and the green more blue.

1726. When a compound colour is contrasted with one of its own elementary or simple colours, the compound colour loses that which is common to both, and the simple colour is modified by receiving the complementary of the compound colour with which it is contrasted. Thus, with orange composed with yellow and red, and pure red, the orange loses some of its red, and appears yellower; whilst the red, receiving the complementary of the orange (namely, blue, as has been already shown), appears bluish.

1727. If two simple colours are contrasted, we find that the general principle before laid down still holds good. If we contrast, for example,—1. *Red and yellow*, it will be found that the red appears tinged with purple, and the yellow with green, because violet, the complementary of yellow, is added to the red, and green, the complementary of red, to the yellow. 2. *Red and blue.*—The red has a tendency to become orange, and the blue green, because orange, the complementary of blue, is added to the red, and green, the complementary of red, to the blue. 3. *Yellow and blue.*—The yellow has an orange, and the blue a violet tinge; because orange, the complementary of blue, is added to the yellow, and violet, the complementary of yellow, to the blue.

1728. The following results have been obtained by actual experiment. Different colours were placed in juxta-position, and agreeable and disagreeable combinations carefully noted. The following propositions are generally allowed to be correct by those who have made the harmony of colours their special study:—

I. The complementary arrangement is superior to any other for harmony of contrast. To produce the best effect, the colours should be as nearly as possible of the same tone: white comes in best in the complementary arrangement of blue and orange, and worst in a combination of yellow and violet.

II. The simple colours,—red, yellow, and blue,—combined in pairs, go together better than one simple colour and one binary colour containing that simple one. For example:—

Red and yellow harmonize better than red and orange.
Red and blue ditto ditto red and violet.
Yellow and red ditto ditto yellow and orange.
Yellow and blue ditto ditto yellow and green.
Blue and red ditto ditto blue and violet.
Blue and yellow ditto ditto blue and green.

III. In an arrangement of one simple colour with a binary colour containing the simple one, the brighter the latter is, when compared with the former, the better the contrast; or, in other words, in arrangements of this sort, the tone or intensity of the simple colour ought to be lower than that of the binary colour. For example:—

Red and violet contrast better than blue and violet.
Yellow and orange ditto ditto red and orange.
Yellow and green ditto ditto blue and green.

IV. When two colours harmonize badly, they had better be separated by something white.

V. Black never produces a bad effect when combined with two bright colours. In such cases, indeed, it is often better than white, especially when separating the one colour from the other. For example,—Black produces a harmony of contrast with the following binary arrangements; viz., red and orange, red and yellow, orange and yellow, orange and green, yellow and green.

VI. Black associated with dark colours, such as blue and violet, or with bright colours with a deep tone, produces harmonies that often have a good effect. For example, an arrangement of black, blue, and violet, is better than one of white, blue, violet, white, &c.; the latter being too violent.

VII. Black with two colours, one bright and the other dark, is not so good as when the two colours are both light; and in the first case, the brighter one of the colours, the more the effect produced. Thus, in the following arrangement, black is inferior to white:—

Red and blue.
Red and violet.
Orange and blue.
Orange and violet.
Yellow and blue.
Green and blue.
Green and violet.

Lastly, with yellow and violet, if not inferior to white, black, at all events, produces but a middling effect.

VIII. Grey, with two luminous colours, though perhaps it does not produce a decidedly bad effect, makes the arrangement look flat, and is inferior to black or white. With red and orange, perhaps grey may be better than white; but it is inferior to it, as well as to black, when placed with red and green, red and yellow, orange and yellow, orange and green, or yellow and green; it is also inferior to white, with yellow and blue.

IX. Grey associated with dark colours, such as blue and violet, and with bright colours of a deep tone, does not produce so good an effect as black in the same cases. If the colours do not look well together, it is better to separate them.

X. Grey and two colours, one bright and the other dark, is better than white, if the latter produces a contrast of too deep a tone, and better than black, if the latter increases the proportion of dark colours too much. For example, grey is better than black with green and violet, green and blue, orange and violet.

XI. When two colours harmonize badly, they had better be separated by white, black, or grey; but, in so doing, attention must be paid to the tone of the colours, and to the proportion of light and dark colours. For example, as to the tone of the colours, the effect of white with red and orange is lessened in proportion as their tones are deepened. Black, on the contrary, does very well with the same colours at their normal tone; that is, when, without containing any black, they are as intense as possible. Lastly, grey is not so good as black with red and orange, nor does it produce so violent a contrast as white.

1729. Then, again, with regard to the proportion of light and dark colours, whenever the colours differ too much, either in their tone or by the brilliancy of the black or white associated with them, the arrangement in which each of the two colours is separated by black or by white is preferable to that in which the black or the white separates each couple of colours.

1730. Thus the arrangement—white, blue, white, violet, &c., is better than the arrangement, white, blue, violet, white, &c.; so black, red, black, orange, black, &c., is better than black, red, orange, black, &c.

1731. Colours are also separated into cool and warm colours. The former should prevail in gardens laid out on gravel, which is itself generally a warm colour; the latter in those laid out on grass, which is invariably a cold colour. For instance, in gardens on gravel, grey, lilac, yellow, white, blue, green, &c., should predominate; in those on grass, purple, pink, scarlet, and orange should prevail. White, however, is equally suitable for gardens of both descriptions, and, unless where the gravel is very light, is always striking and effective; and nothing can well be more chaste or beautiful than beds, broad margins, or lines of white contiguous to grass,—it is equally striking in juxta-position to bright red gravel. As a practical rule, the most intense colours should be placed in the centre of beds, and the less decided tints used for contrasting rings or edgings. Generally, too, the smaller the beds the more liberally may the intense colours—as scarlet, &c.—be introduced, and *vice versâ*. A bed containing fifty plants of Messrs. Woodroof's or Robinson's Defiance verbena is a gem of beauty; a large bed of 500 dazzles and offends by its excessive glare. In nearly all cases, such masses require broad margins of complementary or contrasting hues to impart the charm of softness and subdued beauty. The cool colours already noticed, and neutrals, —that is, mixed hues or plants of no very decided colours,—are often used with the happiest effect to soften and tone down the influence of very brilliant tints. Much exception has been taken to the present style of furnishing flower-gardens, on the ground of the monotony or flatness of surface it induces. Some would be inclined to designate it *a dead sea*, and I must admit that it is often a level plain of beauty. But it should be borne in mind that smoothness and evenness of surface is one of the elements of beauty. Besides, to enjoy beauty in masses, the eye must be able to see it at a glance. Nothing must be too high to intercept the line of vision, and break up unity of expression and oneness of effect, compelling us to look at it in detail only. Every separate part of a garden, like a picture, should be beautiful in itself; but all should appear subservient to the grandeur of the whole. Hence the superiority of the present to the old-fashioned plan of furnishing the flower-garden. It is not so much that we have more and better flowers (although we have this), but it is chiefly that they are more tastefully disposed and better seen. This also constitutes one of the chief charms of Dutch, or sunk gardens. Standing at a considerable elevation above them, the eye sees, and the mind comprehends the whole at a glance; and if they are well furnished, the result is the highest amount of pleasure with the least effort. However, those who desire more variety in the sky outline of their gardens, can introduce tall trained plants of scarlet geraniums, brugmansias, heliotropes, fuchsias, cassias, &c.; or tropæolums, convolvulus, and other climbers, as centres to their beds.

1732. Those who have seen the rows of circular beds furnished in this manner by Mr. Robert Fish at Putteridgebury can hardly fail to be charmed with this style. These *starers*, however, as they are technically called, require great taste and judgment in their introduction, and are seldom either effective or admissible, except in circular beds. As ribbon borders are now so fashionable, the following remarks and arrangements from Mrs. Merrifield's excellent essay on the Harmony of Colours, exemplified by the Exhibition, may be studied to good purpose, although, perhaps, neither of them are examples of the *best ribbons*. The following is something like a natural prism or rainbow:—

Dark crimson.
Mixed.
Geranium.
Red.
Orange.
Yellow.
Green.
Blue.
Violet.
Dull red.
Grey.
Mulberry.

1733. The following is given as an instance of defective arrangement:—

Dark blue.
Scarlet.
Green.
Buff.
Violet.
Green.
Pea-green.
Black.
Dark green.
Scarlet.
Blue.
Scarlet.
Violet.
Orange.
Cool green.
Brown.
Salmon.
Pea-green.
Blue.
Black.

1734. Here we have black, dark blue, and pea-green in succession; sapphire-blue between two scarlets, pea-green between black and blue,—all unpleasant combinations of colour. The dark and light colours are arranged indiscriminately, without any regard to effect. The following arrangement of the same colours will be found more agreeable:—

Dark blue.
Orange.
Sapphire-blue.
Black.
Green.
Dark brown.
Scarlet.
Pea-green.
Violet.
Salmon.
Black.
Pea-geeen.
Scarlet.
Dark green.
Buff.
Violet.
Green.
Scarlet.
Dark blue.

1735. In this arrangement, the dark and brilliant colours, such as orange and scarlet, occur at regular intervals, all the inharmonious contrasts of the last diagram are avoided, and the colours are arranged, as nearly as the materials will admit, according to the laws of contrast: light and dark blue are opposed to orange; scarlet is contrasted with green, and green with violet.

1736. In pictorial arrangement, variety of colour is obtained by the introduction of different hues of the same colour, and of different degrees of brightness. For example, although it is proper to repeat certain colours, as red for instance, it is not necessary that all the reds in a picture should be a bright vermilion-colour: on the contrary, the picture will gain in beauty if one should be of a dull earthy red, a third crimson, and so on, through all the scale of colour. Mr. McIntosh, in his "Book of the Garden," remarks upon this thus:—"This rule will be of assistance to gardeners, as it extends the coloured material at their disposal. The principle of repetition is quite in accordance with the laws of harmonious arrangement." The following is an example, the colours used being scarlet, orange, black, white, blue, green, and some of the semi-neutral colours. They may be arranged with excellent effect, thus:—

Dark blue.
Scarlet.
White.
Black.
Blue.
Brown.
Scarlet.

White.
Black.
Light drab.
Black.
Orange.
Black.
Light drab.

Black.
White.
Black.
Claret.
Orange.
Grey.
White.

Scarlet.
Dark green.
Crimson.
White.
Dark grey.
Dark red.
Black.

1737. However, such repetitions are seldom practicable or desirable in actual planting. It would require a border ten yards wide to hold such an arrangement; and if ever so successfully managed, too much of a good thing would be the general verdict.

1738. Ribbon-borders, from six to twelve feet wide, and planted with so many distinct and separate colours, are generally the most effective. For the greatest width here stated, perhaps they are most beautiful divided by a row of the tallest plants in the middle, and both sides planted alike, or different in colour, but similar in height, gradually falling from the centre to the sides. My largest ribbon this season rises from front to back eleven rows deep. It is bounded on one side by a terrace-walk fourteen feet wide; on the other, by a gravel walk five feet wide. The following is the arrangement:—

1st Row.—Lobelia speciosa.
2nd Row.—Cerastium tomentosum.
3rd Row.—Golden-chain geranium.
4th Row.—Purple King verbena.
5th Row.—Calceolaria aurea floribunda.
6th Row.—Punch's scarlet geranium.
7th Row.—Ageratum mexicanum (medium-sized variety).
8th Row.—Ceneraria maritima.
9th Row.—Perilla nankinensis.
10th Row.—Dwarf yellow dahlia.
11th Row.—Crystal Palace scarlet ditto.
12th Row.—White verbena.

§ 4.—The Kitchen-Garden.

1739. To secure a supply of vegetables in the winter and early spring, all arrangements not already completed should now be made without delay; the growth of those already planted encouraged by hoeing and stirring the earth round the roots, and where slugs abound, their ravages counteracted by sowing soot or lime on the soil.

1740. *Celery.*—The earthing-up of this useful vegetable now demands special attention. The sowings made in July and August will now be ready for transplanting. The cultivation varies in many districts, Lancashire producing plants which, for size and delicacy of flavour, are unsurpassed; and it may be worth while to examine the several modes of cultivating so desirable a vegetable, which, as we learn from Phillips, is "aperient, diuretic, febrifugous, and vulnerary, both the roots and seeds being used in obstructions of the liver and spleen: they warm and dry; they purify, attenuate, and carry off fevers, jaundice, and dropsies."

1741. The celery-plant, *Apium graveolens*, is a biennial in its wild state, although the mode of cultivation adopted makes an annual, except when grown for seed: it grows naturally in our marshy grounds, but we are indebted to Italy for the esculent vegetable as well as the name, *celeri*; *ache* being the popular English name given to it by Ray and the older writers. It is propagated by seed, which is best obtained from the seed-shops. It may be sown in any month from Christmas to April. To get plants for the table in September, it should be sown in February in pans, which should be placed on a moderate hotbed: in about three weeks they will germinate, and, when about two inches high, the plants should be pricked out under glass, either in a frame or in pots, in a compost of loam, and three parts well-rotted dung. If in pots, shift them in April, and at the end of May plant them in shallow trenches in a warm part of the garden. If the trenches are dug out to the depth of two feet, six inches of hot dung placed in the bottom to stimulate the plants, the soil replaced, and the plants put in and covered with hand-glasses, an early crop will be the result. A second sowing should be made in March, still on a hotbed or in pans, or protected by sashes and mats until the plants are up; when fit to handle, they should be pricked out on a slight hotbed, or on a warm border. After a few weeks they should be again transplanted into a similar bed, and placed four or five inches apart each way. In July the plants will be fit to plant out in trenches for autumn use; a third sowing in April, treated in a similar manner, will be ready for winter use, pricking them out in fresh loam and decomposed leaf-mould when large enough to handle.

1742. The mode of cultivation recommended by Mr. Cuthill "is to dig out a trench two spades deep and five to six feet wide, banking up the mould on either side in the bottom of the trench; fill in a foot of the strongest manure, such as decomposed cow-dung, and cover it over with three or four inches of mould for planting in; or if the ground is very rich, half the quantity of manure. The plants are then taken direct from the beds and planted, root and head entire, not trimmed,—a plan which ought to be discontinued in everything." The plants are placed eight inches apart, the rows four to six feet apart, according to the size of plants required. When the plants are about 18 inches high, blanching commences by throwing the soil round the roots and ridging up, the intermediate ground being planted with coleworts, lettuce, and other light crops likely to be off before the celery requires earthing-up.

1743. In gentlemen's and other private gardens, where more importance is attached to having crisp well-flavoured heads than those of large size, trenches six feet wide are dug out to a foot deep; in the bottom of this trench a layer of decomposed dung, or decayed leaves, three parts reduced, is laid. This is worked up with the bottom spit of the soil, but sometimes it is laid in, trodden down, and three inches of soil laid over it, in which the plants are set in rows across the bed, nine inches apart, and ten inches apart in the row. Others put a second layer of manure over the first when it has been incorporated with the first spit. This is sometimes mixed with soil before planting, the whole being forked over several times before the plants are put in. Frequent shifting is found useful.

1744. In order to avoid anything approaching a check to the plants, they are taken up and every root and leaf carefully preserved, the bottom of the larger outside leaves carefully examined, and every bud and sucker carefully removed with the point of the knife. Some cultivators go so far as to cut the beds in which the plants are growing into square pieces, and removing the whole mass with the plant by introducing a trowel under it, and planting it bodily to its new abode. Immediately after planting, a copious watering should be given. In its wild state, celery delights in situations where it can receive an unlimited supply of moisture,—and nature is always an excellent guide where cultivationis concerned; celery trenches should then, throughout their growth, receive abundant supplies of water. When planted, the bed or trench is usually a few inches below the neighbouring soil. The trenches should have some means of shading from the glare of the noonday sun; old lights, bushes of firs, or other dense objects, for a few hours every day, will suffice. Crops of peas are sometimes grown between the rows to afford the required shelter, and there can be no more economical mode of supplying it, provided the rows run from north to south, and are sufficiently apart to admit of it.

1745. The subsequent treatment of celery is very simple. Remove all side-shoots and weeds, stir the earth frequently, and water whenever required, occasionally with weak manure-water; sometimes adding a little quick-lime to the water for the benefit of worms and slugs. If the celery-fly appears, a little soot, applied dry or in water, and sprinkled over the foliage, will be useful. After these waterings, a thin covering of dry soil thrown over the trench will check evaporation. As the time for banking-up approaches, it is the practice in some places to tie the plants up with bass strings, partly to keep the outer leaves in proper order, but partly also to assist in the blanching process. When lightly tied up at the top, the centre is encouraged to rise and swell.

1746. It has been a question whether celery should be earthed-up at once, or progressively, putting it on a little at a time. Mr. Judd, a very successful grower, reports to the Horticultural Society, "that it is not well to load the plants with too much mould at once; the two first mouldings, therefore, are done very sparingly, and with the common draw hoe, forming a ridge on each side of the plants, and leaving them in a hollow to receive the full benefit of the rain and waterings. When they are strong enough to bear water, the moulding is better done with the spade, still keeping the plants in a hollow, and continuing the process through the autumn, gradually diminishing the breadth at top till it is drawn at last to a sharp ridge as possible to stand the winter."

1747. In order to prevent the earth falling on part of the plants, Mr. Judd took a long line made of bass, tied the end round the first plant in a row, twisted it round the second, and so round each plant in succession, fastening it to the last in the row. When the moulding is finished, he removes the line. By this means he earths-up without injuring the plants.

1748. Mr. Cuthill performs the operation entirely with the spade,—no hand-earthing is employed. Parallel lines are stretched on each side of the row, and 18 inches from the plant, and the mould is cut out of the alleys to form the blanching ridge, the whole being effected at three different times, and it is not attempted until the plants are 18 inches high.

1749. In earthing-up in the broad or Scotch beds, "the plants," says Mr. McIntosh, "are disencumbered of all side-shoots and suckers; two pieces of 9-inch deal are laid one on each side of the plants, inclining to each other at the top, and kept in their place by a triangular piece of board or wedge, and tied together, while a man at each side breaks up the soil finely, and throws it between the boards as high as it is intended to be carried, which is an average of six inches. The boards are then lifted gently, and the soil falls in between the plants."

1750. Mr. Robert Fish, who has published an excellent monograph on celery cultivation, adopts the tying-up system previous to earthing. He recommends us "not to earth-up for complete blanching more than three weeks or a month at furthest before the plants are required for use, and let this earthing-up be done at once; or, at furthest, not more than twice for early crops. With late winter celery, a similar rule holds as to tying up; but, of course, they should be finally earthed-up by the beginning of November." He recommends coal-ashes to be applied in order to keep off vermin. "For single rows and beds alike, I use," he says, "boards placed fully close to the plants longitudinally, or across, as the case may be, placing a few semicircular pieces of zinc, two to each plant as it stands in the row. Between the boards and the plant, and the zinc and the plant, the ashes are trundled in, and the earth banked up over it in the usual way, and firmly pressed as the boards are withdrawn. By this mode a cone of ashes surrounds each plant, and repels, for a time at least, worms and slugs from eating and disfiguring the stems."

1751. "Notwithstanding my use of ashes, I find the plants suffering from the foliage damping off after changes of temperature and heavy saturating rains. The best remedy is to use a lighter material than even a cone of ashes for banking up." This Mr. Fish found in a rough mixture of coarse hay, leaves, and grass, with which he entirely covered the celery-beds from 6 to 15 inches thick, according to the temperature,—to make it too thick might produce heating; the plants for the winter crops being previously earthed-up fully halfway, with a thick dusting of coal-ashes and soot on the top. Whether in beds or rows, by keeping a cone-like centre, the surface will soon be consolidated so as to throw off rains, while the air freely penetrates the loose mass, and frost is excluded by extra covering in severe weather. By this means the celery preserves all its pleasant crispness.

1752. In lifting celery "always begin at one end of a row," says Mr. McIntosh, "taking the plants up by the roots, and carefully avoid bruising the stems or breaking the leaves. Cut the roots off, and bury them in the trench, but remove the plant to the vegetable-house. Remove the outer leaves to be washed, and reserved for soups. The centre parts carefully examine, and remove discoloured parts; and when washed clean, dip it in clear salt-and-water, to dislodge any small worms: this done, it passes out of the gardener's care.

1753. As frost sets in, a quantity of the crop for immediate use should be taken up; removing the roots and soil, and tying the leaves together, convey them to the root-cellar, and lay them in sand, not too dry. Look to them from time to time, to see that they do not get too dry.

1754. There are many kinds of celery in cultivation for early sorts.

Early dwarf solid white is recommended.

Coles's superb white only differs in colour from his superb red: both highly recommended.

Manchester giant has a high reputation, but chiefly for its vigorous growth.

Old solid red, much grown by London market-gardeners.

Sutton's solid white, highly recommended for its colour and crispness.

Seymour's white champion is recommended for its compact, blanched, and crisp heart.

1755. *Asparagus* being a permanent occupant of the quarter in the usual mode of management, new plantations may still be made on a rich soil, neither wet nor too stiff, but pulverizing readily under the spade. On this soil a coating of rich well-rotted stable-manure, three or four inches thick, should be spread, when the ground should be trenched three spades deep, the manure being buried pretty equally at the bottom spit of each trench. The ground being dug and levelled, divide it into 4-foot beds, with alleys two feet wide between each bed.

1756. Select strong one-year-old plants without tops, and plant them two rows in each 4-foot bed, the rows a foot from each side of the bed, and the plants a foot apart in the rows.

1757. The method of planting is as follows:—Strain the garden-line longitudinally along the beds, a foot from the edge; then with a spade cut out a small trench or drill vertical to the line, six inches deep. In this trench set the plants upright against the vertical side, so that the crown of the plant stands upright, and two or three inches below the surface of the ground, spreading out the roots against the back of the trench, and drawing a little earth round the roots with the hand to steady them. When the whole row is planted, with a rake draw the earth into the trench round the roots of the plants; then proceed with the next row in the same manner. As a plantation of asparagus only comes into bearing the third year, it is sometimes customary to sow a thin crop of onions over the beds at the time of planting, afterwards raking the surface of the beds smooth. As soon as they begin to grow, give a good watering with salt-and-water, about the strength of sea-water; then keep the bed clear of weeds, pulling up all onions, or other surface-crops, where they come up close to the plants, and the new beds will suffer no injury.

1758. Another practice strongly recommended by some cultivators is to sow asparagus-seeds at once on the beds where they are to grow. This requires the same deep trenching and heavy manuring already described. The beds thus prepared, a line is drawn in the 4-foot beds a foot from each edge, and a foot apart. Upon these lines, at every 12 inches, a few seeds are planted about an inch deep. When the seedlings come up, thin out, leaving only one of the most vigorous plants. A bed thus sown, and carefully weeded and manured, and the surface stirred in autumn and spring, will produce buds in the fourth year, and fine large plants in the fifth year, and will continue to bear for twelve or fourteen years.

1759. Established beds of asparagus require top-dressing every spring, and March is the best month for the purpose. This is done by digging in with a three-pronged fork, with short flat tines, a spring-dressing of well-rotted manure, which has been laid on the beds in the previous autumn, more or less thick, according to the state of the beds, loosening every part to a moderate depth, but avoiding the crowns of the plants. This gives free access to the light and air, and free percolation for the water. Immediately after this dressing, rake the beds smooth and regular before the plants begin to shoot.

1760. The French practice is to dig a trench five feet wide and the length of the bed, laying aside the best of the soil for surface use. On the bottom of the trench is laid, first, six inches of rich stable-manure; above it, eight inches of turf; again, six inches of well-rotted dung, and then eight inches of the reserved soil sifted; over this six inches of thoroughly decomposed manure, and six inches more of the soil thrown aside in making the trench, well mixed together by digging. The beds thus formed are five feet wide, with alleys between two feet wide. The roots are planted in the beds in rows 18 inches apart, and 18 inches apart in the rows; a handful of fine mould is placed under each plant, over which the roots are carefully spread, the crown being an inch and a half below the surface; a spadeful of fine sand is now thrown over the crown, and the operation is completed. In order to procure an early supply of this delicious vegetable, they prepare a moderately warm hotbed in the manner pointed out in page 184. On this six inches of rich mould is laid, and a sufficient number of asparagus from an old bed planted. Over this lay a few inches of the same soil, covering the whole with sufficient litter to keep out the frost, or by mats over the frame. The plants will soon start into growth. A little liquid manure applied occasionally will keep up a vigorous growth, and the plants, if properly managed, will be ready to cut by Christmas.

1761. *Cutting Asparagus* is an operation of some delicacy. It should be cut with a saw-edged knife, having a straight, narrow, tapering blade, about six or eight inches long, and an inch broad at the haft, rounding off at the point. When the shoots are fit to cut, the knife is slipped perpendicularly close to the shoot, cutting, or rather sawing, it off slantingly three or four inches below the surface, taking care not to touch any young shoot coming out of the same crown.

1762. *Seakale* may be grown in about nine months from the seed, in the following manner, in place of the expensive and tedious process now followed:—The ground having been prepared in winter, and subjected to a month or two of frost in a rough state, the seed should be sown in the latter end of March or early in April, and even as late as May. Having selected a piece of ground, open but sheltered, trench it three feet deep, using plenty of manure —at least a third part,—mixing it thoroughly with the soil; when ready, strike the ground into 4-foot beds, and sow two rows of seed in patches two feet apart. As soon as the plants come up, thin out to two or three in the patch, and when fairly established, remove all but one. In the course of the season use abundant supplies of liquid manure, and keep the surface well stirred. In autumn the beds will be covered with fine healthy leaves and plump crowns. Pick off the leaves as they decay, and as soon as they are all off, the crowns should be slightly covered with ashes or tanner's bark till wanted for forcing. In November, the plants will be ready for forcing, either on the beds or in some more shaded corner. Treated in the manner described above for asparagus, seakale may be produced as a Christmas vegetable.

1763. *Cardoons*—A perennial in its native country,—the shores of the Mediterranean,—it becomes an annual in this country, the first sowing taking place in the beginning of March, on a very slight hotbed; in April, on the natural ground; and again in June, for next spring's crop. The trenches are dug as for celery, and moderately manured with well-decomposed dung. In sowing, two or three seeds are sown together in a clump, 12 inches apart. Should each vegetate, remove all but one, when six inches high. When the plant is 18 inches high, put a stake to it, and tie the leaves lightly to it, earthing-up the stem at the same time, like celery. Throughout the summer, water copiously and frequently with soft water and a little guano, to prevent flowering. In September the early crop will be fit for use; remove the earth carefully, take the plant up by the roots, which are cut off; the points of the leaves are also cut off to where they are solid and blanched. These are carefully washed, the parts of the leaf-stalks left tied to the stem, and they are ready for the cook.

1764. *Cauliflowers* may still be sown in some situations, and those sown last month are now ready to prick out under hand-glasses, or in frames, as they advance: if the season is mild, they may even be planted out under a south wall, provided the plants are not wet at the roots. Those plants advancing and heading should have the large leaves broken and turned over them, to give shelter from sun and rain, and by having the earth drawn round the stem. The plants sown in May will now be ready for planting out in rows two feet and a half asunder, giving them a copious watering to promote their growth.

1765. *Cabbages.*—Prepare a piece of ground by deep trenching and copious manuring, for spring cabbages, savoys, and winter greens, and keep it forked over regularly until the plants are sufficiently advanced for planting out. When ready, plant them in rows two feet apart, watering them well to settle the earth at their roots. Savoys and spring cabbages, in particular, require a rich soil thoroughly manured with well-rotted dung.

1766. *Broccoli* require also a good soil richly manured: plant them out from the beds in rows where they are to grow, two feet apart each way: water as soon as planted, repeating it till the plants have rooted. Mr. Errington finds an advantage in dibbling a large hole to receive the plants, and filling it up with calcined wood or vegetable ashes. This crop may follow peas with advantage, or even between the rows of late sorts.

1767. *Broccoli Seeds* may also be sown to stand the winter, and come up for a late spring crop.

1768. *Brussels Sprouts and Winter Greens* may also be planted out for autumn use.

1769. *Endive Seeds* sown now will come in to supply plants for autumn use; the green curled being the best for main crops. Water the beds in dry weather, and tie up to blanch plants advancing to maturity. Dig up a piece of good ground, manure well, and rake smooth. In this plant some strong endive-plants a foot apart each way, and water as soon as planted; repeating it in dry weather.

1770. *Small Salading.*—Sow cresses, mustard radishes, and other small salads, every seven days, choosing a shady border, and sowing in very shallow drills, watering daily.

1771. *Lettuces.*—Sow cos and cabbage lettuces in a bed of rich mellow ground; in the first, second, and fourth week, prick out on nursery-beds the plants last sown, and plant out the strongest plants in the open ground. Dig neatly and rake evenly, and put in the plants by line 12 inches apart each way: continue to water till rooted.

1772. *Spinach,* for winter use, sown late in July or early in August, should now be planted out. The prickly-seeded, or triangular-leaved, is the hardiest for winter use.

1773. *Turnip-radishes* (black and white) should now be sown for winter use; also some small Italian (white and red) for autumn use.

1774. *Onions* may be sown of the Strasburg and Welsh sorts, early this month; the former to transplant in the spring, the latter for use in salads. The general crop will be ready for harvesting.

1775. *Carrots* should be sown this month in an open situation, and on light soil, sowing them as soon as the bed will work after digging.

1776. *Turnips* may still be sown for autumn and winter use, the Early Stone being a good sort; sowing immediately after digging, and sowing thin. Hoe the crops sown in May and June in dry weather, and thin out till the plants are seven or eight inches apart.

§ 5.—FRUIT-GARDEN.

1777. The chief work to be done in the fruit-garden and orchard is harvesting and preparation for planting, either to replace decaying trees, or for new plantations. In either case let it be understood, that while something of the future success depends on soil, subsoil, and situation, on which subjects we have already remarked, perfect drainage is indispensable. Soil and subsoil may both be corrected by properly-prepared stations, if the drainage be sufficient; without it success is impossible.

1778. Early apples and pears, now coming on, should be gathered a day or two before they are ripe; and it is not unusual to make two or three gatherings from the same tree, for, if gathered too soon, they shrivel; and if suffered to remain on the tree after maturity, much of the best fruit will fall and get bruised while being gathered. As they are gathered, lay the pears singly, and the apples in tiers, of not more than two deep; and separate, carefully, all bruised fruit. All lateral shoots of wall-trees and espaliers should be cut pretty closely in, there being no danger now of their breaking.

1779. *Peaches and Nectarines* require to have the future bearing-shoots nailed in closely, and all laterals not required, removed, so that the fruit may have the full benefit of the sun, from which it derives the colour and flavour. A few of the leaves may also be removed where they shade the fruit too much. As the fruit approaches its ripened state, nets should be extended beneath it to catch any falling fruit. To protect the fruit from wasps, use Haythorn's hexagon netting; it admits of perfectly free circulation of air, and at the same time keeps off wasps and flies. Should mildew appear at any time, dust the shoots with flour of sulphur; an occasional washing with soap-suds and syringing with pure water will also be useful, avoiding, of course, approaching too near to the fruit with either.

1780. The object of training and pruning is to produce fruit. If this is not specially attended to in the case of the peach and nectarine, the fruit will be small, as well as "few and far between." To suffer trees to throw out long luxurious branches, to be lopped off at the end of their growth, reason tells us must be bad management, while Mr. Rivers tells us that all the pruning required for wall or dwarf trees should be done with the finger and thumb alone; that is, he would pinch off every shoot not required in the future economy of the tree. By this means he would direct all the sap of the tree to the production of strong young wood and fruit. It is obvious, therefore, that if pruning has been neglected hitherto, no time should be lost in getting them in order now. Let all very luxuriant wood and fore-right branches, as well as all straggling branches, be cut out, leaving ample store of young shoots, however, for next year's use, nailing all in close and regular to the wall at their natural length, so that all branches laid in in former months are firm in their places, and all gross shoots stopped. Make a final thinning of apricots, peaches, and nectarines; stop and thin plums, and syringe continually for insects. M. Du Breuil recommends the application of a solution of sulphate of iron dissolved in water, in the proportion of twenty-three grains to two pints of water, to the peach. "It stimulates the absorbing properties of the leaves, which thus attract more vigorously the rising sap." He also applies the same solution to the fruit at three different stages of its growth, moistening the fruit with it when it has attained a fourth of its growth, again when it is half-grown, and, finally, when at three-fourths of its size. The solution excites its various absorbing organs, attracts to them a quantity of the sap, and greatly increases the size of the fruit.

1781. As the fruit begins to ripen, the attacks of wasps and snails become very annoying. For the benefit of the former, hang up some phials filled with sugared water or beer. This will attract the wanderers from their quarry. Snails must be looked for diligently after a shower of rain, and a train of powdered lime round the stem will keep them off in dry weather. They are also subject to attacks of the red spider during dry weather. As preventive as well as cure, wash the trees with water in which flour of sulphur is held in suspension. At the same time give them a good soaking with water at the roots; thick mulching will also strengthen the trees to resist this insidious foe.

1782. *Apples, Pears, Cherries, and Plums.*—Apples require very little attention now; a slight thinning-out of cross-shoots, bearing in mind that with the apple, as with all other fruit, the best grown is at the extremities of the branches; therefore encourage short-jointed wood; and in shortening any of them prune back to a bud which, from its healthy appearance, indicated by its brownish green, promises to extend the tree. The *Pear* requires more energetic treatment. The young spray, which requires thinning out towards the end of June, and the removal of all watery-looking shoots, reserving all of the opposite character for selection in winter. At this time, also, stop all young shoots, except those at the extremities of the branches, by pinching out the terminal bud, and tying down to the rails all such as do not interfere with the fruit-spurs. Cutting back such as do interfere to two or three eyes, leave as many leaves as possible round the terminal bud.

1783. The *Plum,* in moderately rich soil, has a tendency to produce gross shoots between the stem and the extremity of the branches. These, if they have not been removed, now require the foremost care; where they are not required, let them be cut away, reserving all short-jointed wood and leading shoots necessary to balance the tree.

1784. With the *Cherry* little or no shortening-back is necessary, pruning being confined to thinning away cross and interior shoots on standard trees, and spurring back those shoots which are too close together.

1785. All kinds of fruit-trees may now be budded; branches added where required, by approach-grafting or inarching; and trees of healthy growth, but bearing indifferent fruit, may now become the stocks for a fruit of superior quality by the processes already described.

1786. *Gooseberries.*—Thin out all overloaded bushes, stop and thin out all shoots, and mat over where necessary, to retard ripening. Look over the bushes for caterpillars, and destroy by every possible means. Many expedients are recommended for the destruction of these pests. Hellebore powder, digitalis, and unslaked lime, have been tried; and a layer of tanner's bark laid on the ground in the autumn is said to have had the effect of keeping away insects. Prune away all side-spray in currants, and stop raspberries when sufficiently high.

1787. There is a mode of training fruit-trees which originated in France, but which has been imported into some of our best gardens,—at Trentham, for instance. There are five lines set out for the culture of choice apples and pears on the wire-training system; they are alternately cup- or vase-shaped, and the reverse, or umbrella-fashion, which has an excellent effect, and appears to be very fruitful.

1788. In the gardens of the Luxembourg, the quarters in the fruit-garden are surrounded with borders planted with cherry, plum, and apricot trees as standards, while others are trained in the vase-shape, on 4-foot stems. The head is formed hollow, the shoots being annually tied down to hoops of wood of the circumference required; and all shoots which spring up in the centre of the vase pinched off. Supposing a tree to have six shoots, they are tied to a hoop at equal distances all round, and shortened to a few inches above the hoop, so as to leave them about a foot in length. From each of these two other shoots are trained towards a wider hoop, parallel with the first, in the following season, and this is continued annually until the desired form is attained, and the head of the tree completely balanced in its cup-like form. At Trentham and elsewhere this form is attained by means of a light iron wire frame, the umbrella form being produced in the same manner, the wires radiating from the centre corresponding with the number of shoots issuing from the stem, with hoops of thin wire on which the lateral shoots are trained.

1789. Another arrangement of the cup-trained tree is recommended by M. Du Breuil. Starting with four primary lateral shoots, these are suffered to extend themselves horizontally for the first year. When they are tied to the hoop and stopped, each of these will throw out two shoots the second year, being kept at an equal degree of vigour by pinching. At the end of the second season, these eight shoots are cut back to a foot from their base, with two buds on each; those issuing on the left side of the shoot being trained on a hoop towards the left, at an angle of about 30°; those on the right, at the same angle, in the contrary direction; each thus crossing another at the same angle, and consequently at the same distance from each other. During the third year sixteen shoots are suffered to grow, the circle widening with each year, or rising at the same circumference, according to the taste of the trainer; and this special training is continued until it is seen fit to stop its further growth, each of the branches being grafted by approach to that which crosses.

1790. The advantage presented by this mode of training is said to be a more equal distribution of the sap in the whole extent of its branches, and consequently a more equal distribution of fruit, the fruit on spurs being obtained in the same manner as in the pyramid trees.

1791. *Strawberries.*—Alpines are now in full bearing. This is also the season for saving seed, if seedlings are desired for planting. Selecting a few of the finest bearers, let them be fully ripened, and the seed saved. Take the fruit and rub it on a piece of glass or slate, so that the pulp may dry up, when the seed may be rubbed off and preserved till the season for sowing in the spring. Runners, which is the only means by which plants are obtained true to the sort, should also be encouraged to grow, but no more than is required for new beds, as the fruit is always largest and best where the runners are trimmed off.

§ 6.—FLOWER-CULTURE UNDER GLASS.

1792. *Conservatory.*—For several months past the great difficulty here has been one of selection. It is not flowers merely that must be had; but what flowers shall we choose to accept?—Azaleas, geraniums, fuchsias, balsams, globe amaranths, achimenes, liliums, gloxinias, begonias, &c. &c., have been jostling each other for the best place; each form and type of beauty has been striving by turns for supremacy, and it has been unfolded so copiously and rapidly that the great difficulty has been to bring it all into direct proximity with the eye in this house, devoted to the conservation and exhibition of floral loveliness. For the former purpose it can hardly be kept too cool at this season, omitting, however, all draughts upon stove-plants; and for the latter, tasteful arrangement is the most important point. Too many beautiful things crammed together without order or system are never so satisfying as a very few disposed to the best advantage. Good specimens must also have plenty of space if they are to continue good. During this month the climbers on the roof must be gradually thinned and the shading partially withdrawn, to allow the wood of both permanent and temporary occupants of the house to ripen well. Much of next season's success depends upon this. Well-ripened wood will also enable plants to pass through the winter better, and to bear a greater amount of cold with impunity. To most plants, except balsams and fuchsias in small pots, liquid manure must now be given sparingly, if at all.

1793. The object now is not rapid growth, but abundance of flowers and matured wood; therefore, even pure water must be given as sparingly as is consistent with good health. In dull weather, sprinkling of paths, and other summer expedients to maintain a humid atmosphere, should also be abandoned. Perfect cleanliness will of course be maintained, as beauty and dirt are not only irreconcilable, but the latter neutralizes and destroys the influence of the former.

1794. *Greenhouse.*—This structure should at once be got ready for its winter occupants. Many of these, such as ericas, epacrises, azaleas, camellias, have probably been in the cold pit, or sheltered situations out of doors, for the last four months. In ordinary seasons they will be safe enough there until the end of September. Meantime, however, if the house requires painting or cleaning, the sooner it is done the better. Probably the fumes of paint do not injure plants, but they are very unpleasant to plant-owners; and the paint stands much better if it has time to become quite hard before the house is used. Greenhouses that have no climbers on the roof should all be fumigated with burnt sulphur several days before any plants are brought into them. This is certain death to all animal life, if all contact with the outer air is cut off, and insures, if the plants are clean when brought from their summer quarters, perfect freedom from insects throughout the winter.

1795. *Stove.*—To a certain extent all that has been said about comparative dryness in connection with the conservatory is equally applicable here. However, the higher temperature maintained, and the difference in the nature of the plants occupying this structure, render a greater amount of moisture necessary; but an autumn—and neither a spring nor summer—temperature must be maintained. Plants with succulent leaves must also be gradually inured to as much sunlight as they will bear. This, while it will injure the appearance of some variegated and fine-foliaged plants, will improve others. Some of the caladiums, such as pictum, Newmanii, and bicolor, assume the most vivid hues when fully exposed to the light. Others, such as argyrites, Belleymei, look most beautiful and delicate when considerably shaded. It is best for the strength and vigour of the roots of all caladiums to have their leaves fully exposed to the sun and gradually matured in the autumn. This process must, however, go on gradually, and the greatest care must be exercised in getting a plant like Cyanaphyllum magnificum, for instance, in full vigour, to bear the full blaze of an autumnal sun with impunity. The smallest drop of condensed water on such a leaf, or on almost any begonia leaf, will in half an hour do irreparable damage. The heating rays of the sun convert each drop into a burning lens, which quickly parboils the delicate texture of their leaves. Caladiums are not so often injured in this way, as their composition and structure seem specially adapted for throwing drops of water off their surface. Clerodendrons, poinsettias, justicias, euphorbias, begonias, &c., must be grown on freely for winter-flowering.

1796. Stephanotis, passion-flowers, jasmines, &c., on the roof, must be carefully trained, cleaned, and regulated. Allamandas often make a splendid display when trained as semi-climbers on the roof of a stove. The new violacea would look well near to the cathartica or other varieties. Achimenes and other plants, suspended from the roof in elegant wire baskets, have a charming effect among climbers, and make the roof at least as showy as either shelf or bed. These plants, with gloxinias and Gesneras, will also make a splendid display here during the month. A proper arrangement of flowering and variegated begonias, intermixed with marantas, musas, palms, ferns, caladiums, and a few other fine-foliaged and flowering plants, will give the house an air of oriental grandeur and magnificence such as our fathers could never have conceived.

1797. *Orchid-House.*—More light and air, and less water, must be the rule here. However, those plants that are in full growth must not be stinted by any means, as the natural growing season of most orchids is the rainy season; the season when it rains and rains every day and night, for perhaps six weeks, without ceasing. Rapid growth, long seasons of perfect repose, and sudden excitement, seem to be the chief essentials to successful orchid culture.

1798. All camellias, azaleas, epacrises, heaths, &c., should either be potted directly they are done flowering, or as soon as they have finished their growth. Some of the latest might still be shifted; but this work should have been completed a month ago. Plants potted so late in the season require special care during the winter. All plants seem to have a firmer hold of health and life when the pots in which they grow are thoroughly filled with roots: hence the desirability and safety of early, and the risk of late potting. Heaths must be carefully watched for the first speck of mildew, and immediately dusted with sulphur. As this malady often proves fatal among heaths, it should be carefully guarded against. It is generally induced by an excess of stagnant water at the roots, or excessive syringing, heavy rains, or continuous fogs over the tops. Some of the woolly-leaved varieties seem to have a constitutional tendency to it, arising, however, I believe, from their peculiar structure causing them to retain so much moisture on the surface of the leaves. The later the plants are potted, the more they are predisposed to the attacks of mildew.

1799. *Pelargoniums.*—Great experience in the culture of these enables me to say that the grand secret of profuse bloom is early, strong autumnal growth. I would have given ten times the value of this entire work to have known this fifteen years ago. I have worked my way to this fact by many failures and dear-bought experience. The moment pelargoniums begin to fade, they should be placed out of doors in the full sun to ripen their growth. When the wood becomes slightly browned, cut them down to within two, three, or four eyes of the old wood. Leave them in the same position, or place them in a house or pit to *break*. When the young shoots have advanced from 1½ to 2 inches, shake them entirely out of the pots, slightly pruning the roots; pot them in any light soil in as small pots as the roots can be got into; return them to a close house or pit, and the reduction, re-potting, and re-starting, are finished. I will resume at this point next month, as I only intended now to impress upon the reader the immense importance of getting the plants under weigh as early as possible. All plants intended to flower next May or June should now be ready for removal to their blooming-pots. Harden-off, cut down, and start afresh, plants for late summer and autumn blooming as soon as they are ripe enough.

1800. *Cinerarias.*—Pot-off suckers from old shoots; prick-off, pot, and shift eedling plants, and push forward the first batch for flowering from November to February. Calceolarias require the same general treatment. Shift chrysanthemums, liberally water top for late blooms, and stake. Likewise primroses, pansies, &c., shift into larger pots, and maintain in health.

1801. Provide plenty of linums, Salvia splendens, oxalises, &c., for winter or spring; likewise hyacinths, narcissus, tulips, &c. &c.; pot the first batch, as early rooting is the only certain foundation for good flowering.

D. T. F.

§ 7.—FRUIT-CULTURE UNDER GLASS.

1802. This seems almost a misnomer *now*, as, with the exception of very late crops, the great business at this season is to gather and enjoy the fruit which our skill and perseverance have helped to produce. However, while feasting eyes and appetite upon delicious flavours and tempting fruit, the idea of culture must never be lost sight of. This, either in its past, present, or future tense, must ever be present to the mind, if *success* is to be constan continuous, and all but certain, instead of accidental, fitful, and rare. Living plants must not be treated like a box of raisins or a bag of sugar. It will not do merely to eat the sweets, and leave the trees in a sort of lumber-room of forgetfulness and dirt. Insects are often allowed to perforate, and soot and dust to suffocate the breathing-pores of the leaves. I have also seen the leaves cut off to allow the sun to shine on the *fruit*.

1803. It would be almost as wise to remove a man's lungs, and expose his stomach to the influence of the air, or fill it with an air-pump, to make him healthy. The leaves are the chief instruments in converting certain earthy and saline matters, and air and water, into the proper food of plants. Consequently, the greater the number, provided they are well exposed to the light, and the more clean and healthy the condition of the leaves, the more rich and luscious will be the fruit, and the more robust the health of the plant producing it. But the leaves perform a twofold function; they do not only ripen one year's crop, but they lay the basis of fruitfulness for another season. No sooner do they mature the fruit for the current year, than they begin to store up organizable matter for the next. The quantity of fruit for the next season depends upon the amount of this organizable matter stored up; and the amount stored is determined by the number of clean healthy leaves that are fully exposed to the light. Hence, the longer the leaves can be maintained in perfect health, the better will be the crop for the ensuing season, and *vice versâ*.

1804. Sometimes thrip attacks peaches, vines, &c., when the fruit is ripe. It is then very difficult to eradicate, as either smoking or syringing with any pungent fluid would mar the flavour of the fruit for weeks, if not for ever. The houses should be thoroughly examined before the *fruit is ripe*, and if a single thrip is visible, it must be at once destroyed. It is a good practice, if there is the least suspicion of their presence, to smoke two or three times in succession to make sure of their destruction. Notwithstanding all I have said about the importance of leaves, as soon as peach-leaves will fall off with the gentlest touch by drawing the hand *up the shoot,—not down*, they may be partially removed. When their adherence to the branch becomes so slight, their elaborating functions are finished; and as there may not be sufficient wind under glass to shake them off, they may be thus assisted by the hand.

1805. *Vines.*—Care must be taken in preserving the foliage of grape-vines, not to allow too many leaves on the lateral shoots. It is the large leaves at the base of the fruiting-branches, near to the main stem, that are of most consequence. The buds at their base will yield next year's crop, and the fuller, rounder, and more plump they become, the larger that crop will be. The great point is to maintain these leaves in health without *inducing new growth* or causing the buds to break. A comparatively dry atmosphere and cool temperature are the chief things necessary for this. These are also the main desiderata for preserving grapes as long as possible. An excess of drought and sudden alternations of temperature are, however, almost as injurious as too much water. If the latter induces decay, the former causes the fruit to shrivel, and robs them of that luscious satisfying goodness which is the chief charm of first-rate grapes.

1806. Ripe grapes must be frequently looked over, and every specked berry be at once removed. If mildew makes its appearance in the late houses, paint the pipes with a mixture of equal parts lime and sulphur, and sprinkle the infested parts with dry sulphur. Prevention, however, is much better than cure; and I have invariably painted all my pipes annually, and have never had any mildew. The fumes of the sulphur from hot pipes can do no harm; they are not disagreeable, and I believe they are a certain preventive of mildew.

1807. *Flues*, however, must not be painted over near the fire, as the slightest ignition of sulphur produces sulphurous acid, and would destroy every leaf. Leave air on all vineries night and day, except where the air is admitted by the roof-lights in wet weather; but where the ventilation is given by openings in the wall, a little air should be constantly left on the house, and fire used in rainy weather to maintain the requisite temperature. Sixty degrees is high enough for all ripe grapes; but late Muscats, now ripening, should enjoy a minimum of 70°, rising to 85° or 90° with sun-heat. See that grapes intended to keep till January, February, or March, are well thinned: the Muscat of Alexandria and the West St. Peter's are the best adapted for this purpose.

1808. *Peach-House.*—The lights may now be removed for six weeks from the early peach-house; or if this is not practicable, as much air as possible should be given night and day.

1809. *Orchard-Houses* cannot have too much air. Where no fire is used, sometimes late varieties of peaches, &c., are grown here, to come in after the fruit out of doors. Fruit on the north side of an orchard-house, with a thorough draught through the house, will be a month or six weeks later than the same varieties on a south or west wall. Maintain all the trees in the most perfect health, and liberally water those in pots with manure-water.

1810. *Figs* require plenty of water when in full growth: in fact, in this state they may be treated almost like aquatics. The second crop of fruit will now be ripening, and those who wish for a third crop in November and December should have stopped the shoots in the middle of August; but where a very early crop is required, the shoots must not be stopped after this period. Great care must be exercised in ripening the wood, and seeing that the embryo fruit-buds are formed in the axils of the leaves. Water must be gradually withheld, and a dryish atmosphere maintained for this purpose.

1811. *Pines.*—Keep a genial atmosphere of from 70° to 83° among fruiting plants: water them with clear manure-water, and refrain from syringing plants in flower and ripe fruit. Providences, and the black varieties for winter fruiting, would be best in a house by themselves from this time. Maintain a steady bottom-heat of 85° to fruiting plants, and 75° to succession plants. Where hot water is used this is easily managed; but dung, tan, or leaves, require greater caution. However, pines grow better, I believe, when the bottom-heat is derived from fermenting material than from hot water. All the succession plants should have already received their final shift for the winter: those planted out in beds, either fruiting or succession plants, must be sparingly watered from this time, as, if the soil becomes too wet, it will dry slowly at this season of the year. Attend to the making of linings; give as much air as is consistent with the maintenance of a proper temperature: gradually withdraw all shade from this period, and endeavour to secure a firm indurated growth before the approach of winter. D. T. F.

§ 8.—Bee-Keeping.

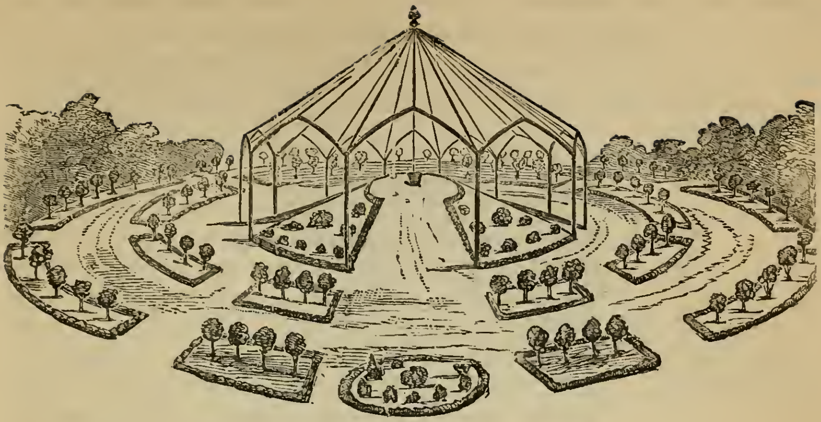
1812. During September it will be necessary to examine the stocks in each hive, with a view to uniting such as are too weak to encounter the winter alone. Weigh all swarms at the end of the season, and ascertain the quantity of honey they have in store; when they are a third or half too light, in place of feeding them, which costs too much honey, join them into one. "For this purpose," says Gelicus, "I leave the heaviest swarm untouched, and in the morning of a fine day in September I commence by blowing a few whiffs of tobacco-smoke with my pipe in at the door of the hive of the lightest swarm; then turning up the hive, and placing it upon its top on the ground, I give it a little more smoke to prevent the bees becoming irritated, and to force them to retire within the combs. I proceed to cut out all the combs in succession, beginning with the smallest, sweeping the bees in with a feather off each piece back into the hive, placing the combs one after another into a large dish, which is kept carefully covered over with a napkin, to prevent the bees returning to the combs. The last comb is the most difficult to come at, being completely covered with bees. I detach it, however, in the same way as the others, but with greater precaution, sweeping the bees off very gently until there is not one left on it; an operation which I perform without gloves or any other precaution, armed only with my pipe, and seldom receive a sting even when unassisted.

1813. "The combs being all removed, theswarm remains destitute of food, and in this state I replace it on its board, and leave it there till the evening; by which time the bees will be clustered together like a new swarm. During the whole of the day, which I shall suppose to be fine, they occupy themselves with great earnestness in cleaning their house and making such a noise, or removing the little fragments of wax that have fallen on the board, that any one who did not know that it had been emptied, would take it for one of the strongest hives. Before night, when all is quiet, I throw in a few whiffs of smoke at the door of the hive which I mean my deprived swarm to occupy, which should be that next to their own; then turning it up, and resting it on the ground, I sprinkle it all over with honey, especially between the combs where I perceive the greatest number of bees. Five or six tablespoonfuls generally suffice: at other times three or four times as much are required.

1814. "If too little were given, the new comers might not be well received, and by giving too much we run the risk of drowning them. Cease sprinkling, then, when the bees begin to climb up above the combs, and shelter themselves on the sides of the hive. This done, replace the hive on its board, raising it up in front with two little bits of stick, so as to leave a division of an inch between it and the board, to give free access to the bees; I also spread a tablecloth upon the ground before it, with one end raised and fixed upon the board by means of the two pieces of stick placed for the temporary support of the hive; then taking the deprived hive, with one shake I throw the bees out of it upon the tablecloth, which they instantly begin to ascend, while, by the help of a long wooden spoon, I guide them to the door of the hive placed for their reception. A few spoonfuls of the bees thus raised and laid down at the door of the hive set the example; they enter at once, and the others quickly follow them, flapping their wings, and sipping with delight the drops of honey that come in their way, licking and cleaning those also that have received the sprinkling. Next morning I replace the hive, so that it may stand just halfway between its own place and that occupied by the deprived hive. I have frequently united three swarms in this manner, taking care to empty in the morning those on each side, and making the bees enter the middle one in the evening, after it has been sprinkled with honey." This operation, so essential to the wintering of the bees, is the great operation of the month.

1815. Equinoctial gales are approaching, and the hives should be rendered secure from their effects; and pedestals and shelves carefully looked to, and the house put in order as in preparation against the winter.

1816. Except in heather counties, the honey season is over in September, and the bees will scarcely get enough to keep themselves. All the hives in the apiary should be weighed, the light ones should be joined on the heavy ones *next* to them, and those taken up should be safely stowed away, or the bees would scent them out and deprive them of their contents. As the bees become less active the entrances should be gradually contracted.



THE ROSE-GARDEN.

CHAPTER XXXII.

1817. THE queen of flowers seems to have escaped from the realms of poesy, for we do not find that any of our recent poets make use of the brilliancy of its colours or the fragrance of its odours in their metaphorical pictures; it is no longer the favoured theme, as it was with the older poets, to celebrate the beauties of this favourite flower. And yet how insignificant are the beauties of the rose as they were known even a century ago, when compared with those of our day. The stores of the East and the West, the tropical forest and the gardens of the flowery land, have been ransacked to fill our hothouses and gardens; and it need no longer be a novelty to find a rival to the cultivator whose boast it was thirty years ago that he had a different rose for his buttonhole every day in the year. The immense variations into which nature and art have combined to divide the family would render this an easy boast in the present day. Among the ancients, the rose was consecrated to beauty, to love, and to friendship. The white rose was the sacred emblem of confidential friendship and social observances; and when suspended over the festive board, all that transpired there was considered inviolable:—

> "Dear to earth its smiling bloom,
> Dear to heaven its rich perfume."

1818. Without wasting our space in discussing the praises bestowed on this delight of the gods and favourite of the muses, it may be mentioned that Dr. Deslongchamps, who has written a learned monograph on the rose, tells us, on the authority of Seneca, that the Roman gardeners had discovered the means of constructing hothouses, which they heated by means of tubes filled with hot water, by which means they induced roses and lilies to bloom in December. Pliny also tells us that roses were produced before their natural season by watering the plants with warm water as soon as the buds became visible; and Virgil sings of

"The Pæstan roses with their double spring,"

although less poetical botanists, who visited Pæstum, have failed to meet with autumnal roses. Anacreon gives a fabulous origin to the rose. In his 54th ode he tells us:—

"When Cytheræa, naked to the light,
Waked from her Neptunian birth!
To fill with love the circling earth,
Then, then, in strange eventful hour,
The earth produced an infant flower
By chance, upon a blooming thorn,
Such as the heavenly halls adorn.
Some nectar drops in ruby tide,
Its sweetly Orient buds had dyed;
The gods beheld the brilliant birth,
And hail'd the rose,—the boon of earth:
They bade them bloom, the flowers divine
Of him who shed the teeming vine,
And bade them on the spangled thorn
Expose their bosoms to the morn."

1819. Its fabled origin, rejected, we may, with M. Boitard, reject also the statements which would give to the whole family an eastern origin. The rose is found indigenous in one or other of its species in every region of the earth; and no other product of nature has been found so obedient to the hand of man in its cultivation. In their geographical distribution, *Rosa pallinaria* is found at the foot of Mount Baldo in the Apennines; *Rosa Lyonii* is a native of Tennessee in America; *Rosa arvensis* is found all over Europe; and the dog-rose, *Rosa canina,* prevails over Europe and Asia, and even in some parts of America. Williamson found the *Rosa blanda* among the icy mountains of the northern part of the American continent, joint tenants of these icy regions with the white bear, expanding its grand rosy corollæ on its solitary stem as soon as the sun had expelled the frozen snow from the valleys, and the *Rosa rapa,* var. *Hudsoniana,* displays its thread-like branches and numerous corymbs of double flowers, of a pale rose-colour, under the Polar circle, on the shores of Hudson's Bay. On the wild coast of Labrador, *Rosa fraxinifolia* and *nitida* are found,—small flowers, with heart-shaped petals. The marshy rice-fields of the Carolinas produce some splendid roses; but the hot moist soil of the country is necessary to their growth, and they languish under the hand of the cultivator in colder and drier countries. On the low hilly ranges of Pennsylvania are found several distinct species,—*Rosa parviflora* among them,—a small but charming shrub, with delicate rose-coloured flowers, rivalling in beauty all other American roses. Further south, the pretty creole girls of Georgia decorate their raven locks with the large white flowers of the *Rosa lævigata,* whose long clasping tendrils twine themselves round and ascend to the summit of the loftiest trees of the forest. The last rose of the American continent we shall mention is the *Rosa Montezumæ.* Its solitary odorous flowers are of a pale red, its stem is without spines, and it was found by Messrs. Humboldt and Bompland on the very loftiest peak of Cero

Ventoso, near the city of San Pedro, in Mexico, on the 19th parallel, the southern limit of the rose on the American continent.

1820. Returning to the Old World, and to that portion of it which is renowned as the birthplace of the human race, we find it to contain a greater number of indigenous, so-called, species than all the other portions of the earth. Of these, thirty-nine have been minutely examined. The vast Chinese empire, where horticulture is so highly honoured, possesses, no doubt, many species still unknown to us. At present twelve distinct species of Chinese roses are known. Among these let us note the charming *Rosa Lawranceana*, or miniature rose, whose stem, full of elegance and grace, only rises from three to five inches in height, which blooms the whole year, its buds rarely exceeding the circumference of a shilling in size. The Banksian rose is another importation from the flowery land, where it is found among the rocks which crown the low hills of the country, where it climbs and entwines itself, covered with small compact double flowers, of a whitish yellow, remarkable for the violet-scented odour they exhale.

1821. In Cochin-China, most of the Chinese roses are found, and along with them some peculiar to the country; among these *Rosa alba*, which is indigenous to Piedmont and other parts of Europe. Most of the Chinese roses are also found in Japan; among them the *Multiflora*, one of the prettiest, and *Rosa rugosa*, whose solitary flower has some resemblance to the Kamtschatka rose.

1822. In Southern Asia many remarkable roses are found, along with others common to China. In Northern India are six species, two indigenous to Nepaul. *Rosa Lyellii*, remarkable for its milk-white flowers, blooms in our gardens during the whole summer, and easily resists the severity of the winter in France. *Rosa Brownonii* is another well-known species, with fine white petals. As we approach the centre, *Rosa macrophylla* is found, which closely resembles the Alpine rose, without being at all confounded with it, its white petals being tipped at the summit with a point of red. Beside it is found the *Rosa cericea*, the under-part of its leaves having a velvety tissue of a silky brilliancy, its flowers drooping and solitary. The burning shores of the Bay of Bengal exhibit in spring a pretty white rose, which is common also to Nepaul and China; the white and nearly solitary flowers of *Rosa involucrata* are surrounded by three or four leaves, which form a sort of collar, and the jungle is rendered nearly impassable by the dense stems of *Rosa semperflorens*, whose evergreen leaves and pretty red flowers seem to bloom without ceasing.

1823. In the gardens of Kandahar, Samarcand, and Ispahan, *Rosa arborea* is widely cultivated; the stem rises to the dignity of a large shrub, covered in spring with innumerable white and odorous flowers, which are manufactured into a scent known as *rosea moschata*. There also grows spontaneously *Rosa verbenifolia*, which differs singularly from all others of its kind, its open star-like yellow flowers being marked in the centre by a large spot of crimson. *Rosa damascena* also grows here, which was transplanted into France by the chivalry who attended Saint Louis in his unhappy crusade, and became the parent of an immense number of varieties now common in European gardens. Lastly, in the neighbourhood of Constantinople is found *Rosa sulphurea*, distinguished by its very double brilliant yellow flowers.

1824. As we approach the North and West, we find in the Caucasus *Rosa centifolia*. Of this species, all that can be said of its beauty, and of the sweet odour it exhales, would still be short of the reality; *Rosa ferox* mingles its grand red flowers with it, and *Rosa pulverulenta* is remarked on the declivities of the peak of Mazana, a spur of the Caucasus.

1825. In the frozen regions of Siberia, the home of the Russian exile, *Rosa grandiflora* and *Cacaussea* are found, the fruit of the latter inclosed in a soft pulp. In approaching the Frozen Sea, just under the Polar circle, in the plains of Iset and Jemisch, between the Oural mountains and Daeurio, grows the *Rosa rubella*, whose petals are sometimes red and much spotted, but more commonly pale and discoloured as the country which surrounds them. More northerly still we meet with *Rosa acicularis*, with pale-red and solitary flowers, befitting the region it inhabits. Ten or twelve more species, including *Rosa kamtschatica*, grow in the Russian possessions of Northern Asia, chiefly remarkable for their solitary flowers and reddish-white colour.

1826. To complete our survey, let us glance at Africa, that land of monstrosities. Here, on the verge of the vast sandy desert of Sahara, and in the plains round Tunis, we find *Rosa moschata* rising in numerous corymbs of white flowers, exhaling a light musky odour. This charming species is also found in Egypt, in Morocco, at Mogador, and in the island of Madeira; and in Egypt the dog-rose (*Rosa canina*) is nearly as common as in our own hedges. In the mountains of Abyssinia is found *Rosa abyssinica*, which has preserved the name of the country. No other species are known in the northern part of Africa.

1827. Glancing at Europe as a habitat of the rose, and beginning with Iceland, a country doomed to contend with devouring volcanoes and eternal ice, with only sixty plants to tempt the botanist. Here, nevertheless, is found *Rosa spinosissima*, better known as the Scotch rose, which grows spontaneously among the fissures of its sterile rocks, its pale solitary flowers affecting a cup-like form. Laponia, only a little more grand by nature—for the burning volcano can almost be seen there also beneath the snow,—has the pretty little *Rosa maialis*, which is also spread over Norway, Denmark, and Sweden. The *Rosa rubella* also, with its blood-red flowers, helps to relieve the oppressive absence of vegetation in Lapland. Other species, of no great importance, are found among the Scandinavian nations.

1828. Ten so-called species are supposed to be indigenous to the British isles. *Rosa involuta* is found in the great fir-forests of Scotland, with dark-green leaves, and great red and white flowers, the leaves exhaling the odour of turpentine when heated. *Rosa sabinia*, a charming shrub, and *villosa*, with white flower and red spots, the flowers commonly united together: this and the dog-rose (*Rosa canina*) are also common there. An anecdote is told of the *Rosa hibernica,* an insignificant shrub, which will bear repeating, even if an invention :—The Botanical Society of Dublin one day announced a prize of fifty guineas to him who should send them a new plant indigenous to Ireland. In reply to the invitation of the pleasantly patriotic savans, this rose was sent, and the sender, saith the story-teller, received the fifty guineas; it is said now to be *Rosa spinosissima,* grown on remarkably sterile soil.

1829. Germany is the least rich in roses of any other European country, *Rosa turbinata* and *Rosa arvensis* being among the most interesting. The Swiss mountains and the chain of the Alps are rich in roses. *Rosa alpina* is a very elegant shrub, with solitary red flowers, and has furnished many beautiful varieties to cultivation. *Rosa spirifolia* here also exhales an odour of turpentine, and is remarkable for its shiny foliage. *Rosa rubifolia* is also common to the Swiss and French Alps; its reddish hue and pretty flowers of spotted rose-colour contrast finely with the foliage of other trees. Italy and Spain have also some species particularly their own: *Rosa pallinaria* has here grand purple flowers, united in twos or threes, and is found on Mount Baldo; *Rosa moschata* and *Rosa hispanica* both grow in Spain, the last having clear red flowers, and blooming in May.

1830. The Evergreen-rose (*Rosa sempervirens*), common in the Balearic isles, grows spontaneously in the south of Europe and on the Barbary coast, its climbing branches bearing a foliage always green and pleasant to look at, intermingling with white odorous flowers.

1831. There are seventeen species of roses indigenous to France, according to De Candolle. In the south, *Rosa Eglanteria* (a yellow rose), with many charming varieties, gilds the shrubbery,—its corolla a fine red, with varieties approaching to yellowish red; *Rosa spinosissima* is also here; its white flowers and yellow eyes have furnished many of the finest varieties to cultivation. *Rosa cinnamonica* owes its name to the stem; *Rosa parvifolia* (the Rose of Champagne) is one of the prettiest miniature roses of the parterre; its flowers, always double, being a fine purple: *Rosa gallica,* whose flowers naturally produce a great variety of shades. In the eastern Pyrenees, *Rosa moschata* grows spontaneously,—a fine rose, whose numerous flowers, borne in a corymb, exhale a delicious odour, having a slight musky smell, and known in French gardens as the Rose Manadine. *Rosa alba* is common in the hedges and in every wooded hill, and is generally cultivated in our gardens, where it has yielded numerous varieties to cultivation; *Rosa canina* is also common everywhere, yielding the stocks required for budding and grafting. It is evident, from this rapid sketch of its natural distribution, that the Rose cannot be said to be of Eastern origin; it rather seems to have been universally diffused, as it deserved to be.

§ 1.—PROPAGATION.

1832. The Rose is propagated by seeds, by cuttings, by layers, by budding, and by grafting, and new varieties are produced by hybridization,—that is, by transfusing the male pollen of one flower into the stigma of another, with the object of producing seed which shall reproduce the best properties of both the parent plants.

1833. *Hybridization.*—Botanists apply this term to a plant produced from two parents of different species; and of all products of vegetation the rose has, perhaps, yielded the most numerous varieties to cultivation: this has also occurred, in all probability, in a state of nature. A plant is in flower, and the wind, an insect, or the industrious hand of the gardener, conveys the pollen or powdery matter which accumulates on the ripe style of the male flowers, to the equally ripe stigmata of the female flower. The stigma absorbs the moisture from the dusty particles of the pollen, and it fructifies; the seed which results from the operation produces a new variety, partaking of the more prominent properties of both parents.

1834. In order to produce this result, however, both parents must have certain qualities in common. In the case of animals, a horse breeds with an ass, and produces a mule; but it would not with a cow, nor would the amaryllis, which has been the subject of very interesting experiments in hybridization, succeed when crossed with the crinum or any flower of a different species, so as to be reproductive itself. The reproductive power thus seems to be the line of demarcation between species and mere variety. In fact, Nature has placed limits beyond which the ingenuity of man is exerted in vain; and, although very brilliant intellects arise from time to time to interpret her laws, perhaps to their own satisfaction, the subject of "species" or kind, and their chain of connection, will probably always remain a mystery. In the case of vegetable products, however, it is very evident that a certain organization is necessary to enable one plant to cross with another; differences, perhaps, in the cellular system which are too minute for discovery even by the microscope, may still be, and apparently are, sufficient for hybridization once, but insufficient for reproduction; and that limit has generally served to distinguish varieties from species.

1835. In discussing this question, M. Boitard gives many instances within his own knowledge where hybridization was claimed for roses, where the facts were doubtful; and this leads him to think that roses, like many other plants, have a tendency, after a time, to return to their original type. "Why not admit, then," he says, "that roses possess this tendency; is it more difficult to explain, physiologically, how the wild rose comes by culture to possess the odorous properties of *centifolia,* than to explain how a wild pear, with long spines and small sour fruit, has come to be a Duchesse d'Angoulême, or any other of the fine fruits of the present day?" And he concludes by claiming for the rose that it consists of three species only;

namely, *Rosa simplicifolia, Rosa lutea,* and *Rosa centifolia;* all others being mere varieties of these, produced by accidental hybridization, as the numerous varieties of the garden have been produced by art.

1836. "It may be asked," he says, continuing this argument, "if we admit only three species of rose, how explain the striking analogy which exists between the American roses and those of Asia, between those of Asia and those of Europe? The facts explain themselves sufficiently, and only prove that the like causes produce the like results. The rose, like all organized beings, is subject to variations arising from climate; and if men always took into consideration this constant rule of Nature, they would be less apt to make species out of mere variety, arising from local circumstances. Again, arriving at the conclusion that there are only three species of rose, I have submitted all the varieties I describe to analysis, and I have found only two properties invariable:—1. the colours; pure yellow being opposed to white and red; 2. the leaves simple, as opposed to composite leaves; and the only roses offering invariable characters are as follows:—

I. *Rosa simplicifolia.*—Flowers pure yellow, with spines sometimes composite, leaves simple.

II. *Rosa lutea.*—Flowers pure yellow, spines always simple, leaves composite.

III. *Rosa mutabilis.*—Flowers rose-colour, passing through all the shades from white to red and violet; spines always simple, leaves composite."

1837. All other roses are only accidents of climate or culture. It is not necessary that we affirm or dispute the views of M. Boitard, there being, probably, a mean between his views and those who would number the species by scores; it better suits our purpose to group them according to their habit, flowering season, and the requirements of their cultivation.

1838. It will be obvious from what has been said, that the great obstacle to hybridizing in our climate is the difficulty found in ripening the seeds. Tea-scented and Chinese roses must be grown under glass to do so. Most other varieties ripen their seeds sufficiently out of doors. Among these Mr. Paul gives a list of twenty kinds which ripen their seeds perfectly in this country in ordinary seasons. These are,—

Hybrid Chinese.

Chénédole.
Marshal Soult.
Duke of Devonshire.
General Allard.

Hybrid Bourbons.

Athelin.
Great Western.
Charles Duval.

Moss.

Du Luxembourg.
Celina.

Hybrid Perpetuals.

Madame Laffay.
Comtesse Duchâtel.
William Jesse.

Austrian Brier.

Harrisonii.

Bourbons.

Bouquet de Flore.
Malvina.
Ceres.

Rosomène.

Gloire de Rosomène.

French.

Rosa Mundi.

Multiflora.

Russelliana.

Ayrshire.

Splendens.

1839. Having chosen suitable varieties for experimenting upon, and decided the several questions which bear upon the object of the operation, such as the qualities to be obtained from each parent, bearing in mind that colour is supposed to belong to the female and foliage and habit to the male (although this seems founded on very doubtful and varying facts), "they should be planted," Mr. Paul says, "in the sunniest spot in the garden, in a soil not too rich, for this promotes a vegetation too vigorous for the perfect development of the seeds. In pruning, the branches should not be shortened very closely; while growing, the soil ought to be hoed occasionally during spring, and watered in dry weather, caterpillars sought by hand, and aphis got rid of by syringing with soot or tobacco-water. As the flower-buds increase in size, secure a good portion of the earliest and boldest buds, but not all; leave some in different stages of forwardness, and remove all buds forming imperfectly, or in places where the branches will shade them."

1840. Having selected the plant to be impregnated, as well as that from which the pollen is to be taken, and having removed the stigma of the female flower with a pair of round-pointed scissors, just as the flowers begin to expand, both flowers being in a fit state for the operation, the flower of the male parent is brought just over the seed-bearing tree. If the weather is calm, the petals of the former are cut away, the operator holds a finger over the flower of the latter, while the tree deprived of its petals is struck a sharp blow. This sudden shock drives the pollen into the other flower, and the work is done. When the wind is high, it is better to collect the pollen on a camel-hair pencil, and convey it to the styles of the female flower. It is of much importance that both plants are grown in the same temperature. When the stigma is in a fit state for fertilizing, it is indicated by a viscous exudation of the sutures of the stigma; when this is the case, no time should be lost in completing the operation.

1841. When the flowers have disappeared, and the seed-pods begin to swell and ripen, they should be protected from birds; at the same time the pods should remain on the trees till perfectly ripe, and even turning black, when they should be gathered and buried in the earth, either in pots or in the ground, taking care that proper numbers are attached to them, so that there may be no doubt as to the origin of the expected progeny.

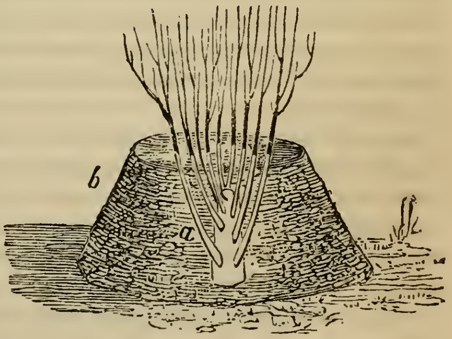
1842. Before sowing, the operation of cleaning the seeds is performed by rubbing them out between the hands, preparatory to sowing in February or March. So soon as the seed-pods are broken up, lay the seeds out in the sun to dry, so that the pulp and husk may be entirely removed, and the seeds sifted and winnowed, when they are ready for sowing. Others prefer sowing the seed immediately on its reaching maturity, and this M. Boitard considers the best plan. In this case they come up the following spring, with all the fine growing season before them.

1843. The hardier kinds may be sown in the open borders, selecting a sunny sheltered spot, with an eastern aspect, and sheltered from the afternoon sun, for the beds: the more tender varieties require a frame and glass.

1844. The beds should be dug 18 inches deep, the soil light and rich, the top spit broken up fine and raked level. In sowing, let the seed be laid on the top, spread pretty thick, as only a third or fourth will come up. Beat the beds smooth with the back of a spade, water, if dry weather, and sift over the whole about half an inch of light sandy soil. If the sowing takes place in spring, keep the seeds in water for three or four hours before sowing, taking care that the germ of the seed, now developed more or less, is not injured. The more delicate roses should be sown in pans thoroughly drained and filled with equal parts of leaf-mould and yellow loam well mixed together. Water, when sown, as directed above, and cover with half an inch of the same soil mixed with a little sand. In each case a sprinkling of soot or lime scattered over the bed will be a necessary precaution against insects and worms, for both of which the tender buds of the rose have great charms. About May some of the seeds will germinate, and others will come up from time to time till autumn; and they now require constant care in shading, weeding, and watering when the soil is dry.

1845. *By Suckers.*—Roses—some kinds much more than others—push their roots in a lateral direction under ground, and throw up young shoots or suckers from them; these suckers, separated from the parent root by the cut of a sharp spade, form flowering plants the same season, if separated in the spring and transplanted to suitable soil. When a rose-tree is shy with its suckers, it may be stimulated by heaping earth round the roots.

1846. *By Cuttings.*—Most roses may be propagated by cuttings; but all are not alike calculated for being thus propagated, bottom-heat being indispensable for the more tender varieties. Where it is necessary to propagate a number of plants from one, however, the method is invaluable; it is especially useful in propagating Chinese and Indian roses, where the young branches are inclined to be woody. Summer and autumn are the best seasons for cuttings. The shoot made in spring is taken with a small portion of last year's wood attached, and cut into lengths of five or six inches, selecting such as have two lateral shoots, with five or six leaves to each. An inch of the old wood should be inserted in the soil, leaving at least two leaves above. From four to six of these cuttings may be placed round the inside of a 60-pot, in soil consisting of equal parts of leaf-mould, turfy loam chopped fine, and silver-sand, watering them well with a fine rose-pot, to settle the earth round the roots. When the water is drained off, and the leaves dry, remove to a cold frame, or place them under hand-glasses, shade them from the sun, excluding the dew, and sprinkling them



daily for a fortnight. If threatened with damping off, give air and sun. In a fortnight *callus* will be formed. At this time they are greatly benefitted by bottom-heat; they root more rapidly, and may soon be shifted singly into 60-pots, and removed back to the cold frame for planting out in August, without bottom-heat. They must be kept in the frames till the spring.

1847. *By Budding.*—The stocks most commonly used for budding and grafting roses on are the common dog-rose (*Rosa canina*) of the hedges; the Boursault and Manetti rose, both of which are obtained by cuttings, the latter being a good stock for the hardier roses, where vigorous growth is required,—the Boursault for tea-scented and Chinese roses. The dog-rose, however, is preferred by many for all purposes. Autumn is the best time for procuring stocks, October and November for planting in ordinary soil: where the soil is inclined to be moist, they are better procured in the spring. The best stocks are those of two or three years' growth, a little over an inch in thickness, with the bark fresh, and having greyish-green stripes. It is remarked that the graft does not take well where the bark is red-coloured. They should be of proper length, straight, well-rooted in the soil, free from spines, and without branches.

1848. In preparing to make a collection of roses, a sufficient number of rose-stocks should be collected in the autumn, or not later than the beginning of January, having trimmed them closely down to the root, removing all knots or dead wood, and cut the stem to the required height, taking care that there is an eye on each side, sloping a little below the summit. A stem so prepared, and planted in rich, well-prepared soil, will soon emit abundance of fibrous roots, and will produce in the following summer abundance of young shoots. These young shoots, whatever their number, are to remain on the stock, but neither thinned nor shortened. They are to be operated on in budding; and their vigorous growth is a proof of the fitness of the stock for its purpose.

1849. The process of budding may be done successfully at various seasons, the first condition being that the branch and stock are in the same state of vegetative progress. The dog-rose is in its best condition for operating on in July or August: to operate earlier is considered a disadvantage. Under very favourable conditions of weather, they may be worked as late as September; but vigorous-growing roses, like the Provence, Moss, Gallican, Damask, Austrian, and other summer roses, are best budded in the former months.

1850. Those stocks, on the contrary, which grow luxuriantly and late, as Manetti and crimson Boursault, are better worked in the beginning of September, provided the stocks are growing freely and the weather warm and sunny; for in rose-budding, where the bud is exposed to heavy falls of rain, it may rot and perish before it is united with the stock. The roses for which these stocks are suited are Perpetuals, Bourbons, Noisettes, China, and Tea roses, and all the autumnal late bloomers. The conditions required are that the bark should rise freely, and that the shoots are getting a little firm: the buds will then take admirably. The same autumnal roses, when budded on the dog-rose, however, succeed best in July and August. In budding, the top bud on the shoot should be commenced with, cutting from an eighth of an inch below the eye to half an inch or three-quarters above it.

1851. In removing buds, and especially from the stem, they should be cut very close, and, if large, the wound should be covered with grafting-wax or clay. In planting the stock, it should be placed quite vertical, and the earth drawn round the roots to retain it in its upright position, while a stake is driven into the ground beside it, to which it is to be attached firmly without injuring the bark. When planted in a line, stakes placed at intervals, with rods connecting them, to which the stocks can be attached, would serve the double purpose of maintaining the straight line and supporting the roses.

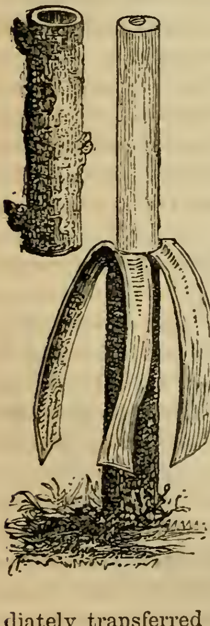
1852. In the month of March the stocks begin to shoot; they now require daily attention; every useless or badly-placed bud should be suppressed, a few only be encouraged, varying according to the vigour of the tree, but never exceeding five in number, preserving those nearest the summit and closest together. They should be opposite each other if only two, at a triangle if three, and two and two if four. Stir the ground at the roots to encourage their growth, and keep it clear of insects by fumigation with tobacco-smoke or washing with tobacco-water.

1853. When the sap begins to rise, it is necessary, if branch-grafting is to be performed, to preserve the equilibrium of the tree by pinching off the leading buds of over-vigorous branches; and a month or so before performing the operation all spines likely to interfere with the budding should be cut off. Where branch-grafting is to be practised, one bud should be placed upon a branch, and that as near to the stem as possible. Where it is to be stem-grafting, one should be on one side and one on the other, opposite to each other, so that one ligature shall serve for both. Where this cannot be accomplished, the buds should be placed as nearly opposite to each other as possible. This operation should be performed quickly, and before the sun has time to dry up the juices of the bud; and when circumstances render delay imperative, the bud should be placed in the shade.

1854. The operation of budding consists in transferring from one tree to another a small piece of the bark with an embryo bud, and inserting it beneath the bark of another. The only instrument necessary is the budding-knife. The process consists in making a cross-cut just deep enough to cut through the bark, and a longitudinal downward cut, making a letter T. Then, with the thin handle of the knife, raise the inner edges of the bark under the cross-cut: it is now ready to receive the bud. This is procured by first removing the greater part of the leaf from a bud, leaving only the footstalk. Now make a longitudinal cut, about an inch in length, beginning below the bud and terminating above it; thus removing the bud with the bark half an inch above and half an inch below the eye, with a thin slice of the wood: this is the cushion or shield. Having removed the wood as clean as possible, the lower point of the bud is now inserted in the open slip formed by the T, and push in the bud, first on one side then on the other, pushing it gently under until two-thirds of it is under the bark, so that the eye of the bud is exactly under the opening caused by the raised edges of the bark. The upper part of the bud is now cut across, so as to fit it exactly into the angle at which the bark of the stock was cut; it is now bound up with worsted or cotton thread, previously prepared. Tying commences at the bottom, passing upward until the whole is covered except the eye of the bud; sometimes a little damp moss or a leaf being tied over it for the sake of the moisture it gives out.

1855. *Grafting* is performed by cutting the top of the stock to a proper height by a clean horizontal cut, and then make a longitudinal V-shaped cut down the centre, one, two, or three inches long, according to the size of the stock. In this slit place the graft, after having cut the lower end of it to fit the cut in the stock. Having inserted it, bind the whole up with clay or grafting-paste, as directed in budding.

1856. It has been asked whether roses *grafted* are equal to budded ones. Mr. Paul says, when the junction is perfect they are quite as good; but the scion and stock do not always coalesce, owing to which, more imperfect plants are raised in this way than by budding. The best time for grafting roses in pots is January; and July, in ordinary seasons, is the best month for budding; but that depends upon the season. Some operators prefer a moist gloomy day for the operation; Mr. Saul, of the Durdham Downs nursery, Bristol, prefers a fine bright day.



1857. From three to five weeks after the operation, according to the dryness of the season, it is necessary to examine the bud and loosen the ligature which binds it to the tree, otherwise the growth may be checked. Budding with shooting eyes is performed in spring, when the bark, both of stock and scion, runs freely; and the process consists in dividing the bark of the stock in four or five longitudinal stripes, and drawing it down so as to leave the upper part bare for the reception of the ring of bark which contains the buds. Before attempting to insert the scion, the stock will be as represented in the engraving. Having selected a scion a shade larger than the stock, with one or two good eyes, hold it in the hand for a minute or two in order to warm and expand the bark, which will then be more easily detached by giving it a smart twist, or, if it is difficult to move, by gently tapping it all round with the smooth spatula or handle of the budding-knife. The flute or tube, when separated, should be immediately transferred to the naked part of the stock: should it be too large, the bark is stripped down until the tube exactly fits the stock, and all its interior surface is in contact with the alburnum. This effected, the strips are sometimes brought over the tube to protect it from contact with the air; more commonly it is cut off, and the tube fitted closely to it, taking care, however, to protect the parts above the tube as well as the ring below, from contact with the atmosphere.

1858. In the month of March the head of the stock is cut down. The bud will now begin to show itself. If there are two of them, they already begin to show a head by the end of the first year; but in order to encourage this development of the bud, it is necessary, in cutting down the head of the wild stock, to leave one eye above the graft,—the *œil aspirant,* as the French gardeners call it, which serves to draw the sap to the summit; the old shoots thus keeping the bud in a state of vigorous growth. When this eye has, however, pushed out two or three leaves, the leading shoots should be pinched off in order to throw the sap into the buds; and when these attain a length of five or six inches, this shoot may be suppressed altogether. It is equally necessary to permit a few buds to develop themselves below the graft, otherwise it would be flooded, as it were, with the flow of sap, and failure would probably result.

1859. In the spring of the second year the first attempt may be made at training the head; all the wood above the graft is cut down close to the stem; the head is neatly trimmed, and the wounds covered with wax or clay; the stem is cleared of all spray, and the roots of all suckers. From this time constant attention is required to the stock and the development of flowers.

1860. With a little art all roses may be made to bloom in winter; but the perpetuals are forced with less difficulty than the summer roses.

1861. The rose grows vigorously in most kinds of soil; nevertheless, it does best in a light free soil, a little fresh, amended from time to time with some well-decomposed manure. A calcareous soil is especially recommended, and *Rosa indica* and *Lawranceana* and other delicate varieties, do best in fertile sandy soils and in peat-earth. The dog-rose grows vigorously in stiff earth.

1862. In respect to its aspect, an inclination either to the rising or setting sun, by which it avoids the direct rays of the sun, is better than a due south or north aspect; and in forming a rose-garden either of these aspects may be recommended. A walled inclosure, where the free circulation of air is seriously impeded, is to be avoided. It should be removed from the influence of overhanging trees. One thing is imperative,—the soil must be thoroughly drained: few plants grow well in soil soured by stagnant water; the rose least of all.

1863. Having fixed on the site of a rose-garden, and made arrangements for draining it, the next point is to prepare it for receiving the future trees. Is it a stiff clay? A month or two of exposure in its roughest possible state is the first preparation required, unless the owner is willing to incur the cost of calcining the earth, which yields the best of all soils for roses, according to some of the best authorities, Mr. Paul among the number. The process of burning soils is described at p. 44. Where burning is not considered necessary, most clay soils may be rendered capable of growing roses by the application of chalk, lime, sand, or other ameliorator. To apply these, level the roughened surface of the land, and apply a top-dressing sufficient for the purpose, and trench the ground two or three spades deep according to its requirements, thoroughly incorporating the manure in doing so. When finished, the station for the roses should be marked and dug out, and remain open till the time of planting.

1864. With regard to the design, it is to be observed that in a well-arranged garden, the rosery should not be put obtrusively forward in the general design, but should be rather secluded than otherwise; a parallelogram of a hundred feet by a hundred and fifty, cleared out of an extensive shrubbery, and thoroughly drained, provided it be not too much inclosed, but open to the south-west or south-east, would form a suitable site for such a rose-garden, as that laid out by Mr. Williams, in Mr. Warner's garden at Hoddesden, of which we give a view at the head of this chapter. In this rose-garden the beds form segments of circles; the four centres form obtuse triangles, all rising to a centre under the pavilion, so that the spectator looks down on the walks and surrounding beds from this eminence. Four central paths lead to this pavilion, which is supported by twelve iron pillars 7 feet 3 inches high, tied together, and forming pointed arches of the same material. A central pillar to which iron rods converge from the crown of each arch; the whole being tied together and covered with climbing roses from the roof.

1865. Another design for a rose-garden was designed by Mr. Herman Seitz, of Munich, when he was employed at Chatsworth some years ago, and published in the *Gardener's Magazine of Botany.* He proposed surrounding the rosery by a shrubbery of common evergreens, with an approach from the pleasure-grounds not very far from the mansion, through winding paths lined with American shrubs; the shrubbery being required to give shelter to the more tender roses. He proposed having a central basin of pure translucent water for gold-fish and choice aquatics, with fountain and vase in the centre; the basin being embowered in climbing roses, twining round the pillars and converging rods of a light skeleton iron pavilion of an octagon form. The posts of this pavilion were to rise outside a circular gravel-walk. Eight obtuse-angled beds, the broad ends rounded off on the outside, abut on, and define this circular walk, the larger ones running longitudinally with the length of the ground, and forming a large oval, 50 feet by 70, laid out in gravel round these beds. Twelve gravel-paths run to each corner of the garden, converging at several angles, and forming angular-shaped beds, while a colonnade nine feet high, covering a gravel-path eight feet wide, surrounds the garden, the *treillage* being of light iron-work, corresponding with the pavilion, and festooned with climbing roses. This colonnade descends, in a sloping grassy bank, from two to three feet deep, into the rose-garden, which is thus sunk, permitting a charming view of the rose-garden from the elevation of the raised colonnade. The beds are to be furnished with masses of dwarf roses in the centre, surrounded with a series of grass lawns, standards being planted at intervals all round them; while standards or pillars of roses occupy the outer angles of each of the beds in the oval gravel-bed, defining as it were the path of its outer circle, while a circular bed of dwarf roses surrounds the basin; and raised seats, bowered in roses, occupy each corner of the garden. Vases, pillars, and pyramids, of course, may be scattered through the ground according to the taste of the proprietor.

§ 2.—CULTIVATION.

1866. We left the rose-garden lying fallow, and the stations dug out to receive the plants at the proper season. Where the soil is a good stiff loam, it will only be necessary to enrich it with some strong manure, as decomposed night-soil, slaughter-house dung, or any similar strong compost, thoroughly incorporating the mass together before filling it in. The distance of the plants apart will depend upon various circumstances. Is the sort a weak or a strong grower? Is it to be pegged down and grown in a mass, or is it to be a bush, in which the habit of the shrub is to appear? In the former case, the stronger-growing varieties should be about two feet apart; in the latter, dwarf bushes should be two feet and a half to three feet apart, in order to show their individual habit; dwarf bushes for pegging down, perhaps more than a foot and a half apart.

1867. Where the beds are intended for pegging down, the soil should be stirred frequently before planting, especially in frosty weather, and where the plants are to be turned out of pots into the beds.

1868. In preparing for planting, trim the roots, whether on stocks or on their own stems, pretty close; removing all damaged parts, and also all dead wood from the stem. Having filled up the hole, so that, when the bush is planted, the crown shall be on a level with the surrounding soil,—for which a turf cut from a field where the soil is pretty good, with the grass downwards, is excellent,—spread out the roots in all directions, leaving the stem perfectly upright, and fill in the remainder of the compost until the whole is level with the soil when pressed down; the compost being a mixture of one-half decomposed cow-dung and one-half stiffish loam for strong-growing kinds, and an addition of leaf-mould for the more delicate Bourbon, Tea-scented, and Noisette roses. In dry weather a copious watering will settle the earth about the roots.

1869. Rose-plantations may be made either in autumn or spring; that is, in the months of October and November for the hardier sorts, or from March to May for more tender varieties. Those planted before the end of November get rooted before the winter sets in severely, and flower better in the following summer. Rose-planting never succeeds after heavy rains, unless the soil has been suffered to dry, and is again worked up to a fine pulverized state. There is also an advantage in having the soil washed into the roots by heavy rains after planting. When the season is over, that is about December, assistance should be given to permanent beds, by removing about four inches of the surface-soil, and stirring that which is below it with the spade or a three-tined fork, so as to loosen the earth without injuring the roots; saturating the soil with strong liquid manure. The drainage from the dung-heap is best; but when that is not available, old night-soil, diluted with five times its bulk of water, may be poured over the beds. This done, fill up the bed again with some rich fresh soil thrown in as roughly as possible.

1870. Tea-scented, and other hardy and half-hardy roses, require protection in winter. Mr. McMillan recommends a trench dug across a bed five or six feet wide, into which a row of roses are placed in a sloping direction, the heads being a foot from the ground; a second trench being dug, and the earth from it thrown over the roots of the first row; and so on to any extent.

1871. A general complaint has been raised that the descriptions of roses, and the names given them, are deceptive; that of the numbers purchased, the purchasers would gladly root out three-fourths of them. Listen to Mr. Glenny on this subject:—"We think," he says, "the families are badly distinguished; that the sections ought to be arranged so that all men can distinguish them. *Moss roses* are understood by everybody. *Summer roses* should comprise all those which bloom in one month only; *Noisettes*, all those which flower in bunches; *Continuous Bloomers*—call them what you please,—all those partaking of the nature of old China, growing and flowering till the frost cuts them off; *Climbing*, all those which make strong long shoots every season. But who cares whether the rose be a damask, a Bourbon, a hybrid perpetual, or a hybrid China, if he can but understand whether the rose he is buying is a summer rose of a month's bloom, or a continuous one that shall decorate his garden half the year?"

1872. Mr. Glenny goes on to say, "The rose-buyer should recollect also, that there are some leading properties in a rose which must not be lost sight of; and the first of these is continuous blooming. A rose-border in a garden ought never, during the season, to exhibit bare rose-trees: better have twenty of one sort, than plant those that are only of temporary beauty. A rose should be circular, full in the face, thick and smooth on the petals, very double, and very symmetrical, otherwise it is not worth growing.

1873. Rose-trees, however, that form part of the features of a garden, should be as long in bloom as possible, of good habit, to form a fine head, and they should be out of the way of walks, and apart from the decorations of the lawn and the brilliance of the flower-borders.

§ 3.—SUMMARY OF TREATMENT.

1. *Provence, or Cabbage Roses.*—Prune close, shortening every shoot three or four buds down, one half in April, the other in October; and keep beds of dwarfs clear from weeds. Propagate by budding and layers in July; graft in March.

II. *Moss Roses* require the same severe pruning as the above, and a light rich soil; pruning one-half in May, the other in October, in order to have a succession of flowers. Propagate by layers and budding in July; graft in March. Some of the new perpetual mosses are very beautiful; as *Madame Ory*, dwarf and compact, of deep rose; *Salet*, pale rose. To insure a free bloom in autumn, shift and replant in fresh compost in November.

III. *Hybrid Provence Roses.*—Prune moderately short; propagate by budding and layers in July, and by grafting in March. Robust, vigorous roses, requiring good soil enriched with manure.

IV. *Rosa alba.*—Prune closely as a standard; propagate by budding and layers in July and August; graft in March.

V. *The French Rose* (*Rosa gallica*).—Prune moderately short, and cut out all spray-like shoots; propagate by budding and layers in July and August; graft in March: mulch round the stems, and water with manure-water in dry weather.

VI. *Hybrid China.*—Prune moderately short; shorten strong branches, and cut out the smaller shoots; propagate by budding and layers in July and August, by cuttings from September to November; graft in March; mulch the surface round the stem in winter with good rich manure, adding to it as the blooming season approaches.

VII. *Hybrid Bourbons.*—Prune moderately short; propagate by layers and budding in July and August, by cuttings from November to December; graft in March.

VIII. *Austrian Briers.*—Little pruning required; only shorten the shoots and thin out old wood, leaving young wood untouched; propagate by cuttings and budding in July and August. It requires a rather moist soil, and dry pure air, and little manure.

IX. *Banksian Roses* bloom on the previous year's wood. Prune in July, when the season is over, and it will produce bearing-wood in the autumn: propagate by cuttings in May and September. It requires a wall, and should be on its own roots: blooms freely in dry soil.

X. *Hardy Climbing Roses* require little pruning; but thin out old wood as soon as the blooming season is over: the after-growth will furnish bearing wood for next season.

XI. *Damask Perpetuals.*—Prune moderately in June, and again in November; propagate by budding and layers in July, graft in March: a dry soil, with an annual supply of manure on the surface, and the soil just stirred in November.

XII. *Hybrid Perpetuals.*—Prune very close in summer; propagate by budding from June till September, and by layers in July and August; graft in March. In June cut off half the number of clusters showing themselves: these will bloom again in August. Towards the end of February cut off from each vigorous shoot of the preceding summer two-thirds of its length, and from weaker ones two-thirds, cutting out all superfluous ones entirely. An annual removal is recommended, stirring the bed well and replanting, adding two shovelfuls of equal parts rotted dung and good loam if the soil be poor, and equal parts rotted dung and road-sand if it be stiff.

XIII. *Isle of Bourbon Roses.*—Prune close to within four or five buds, in April, the more delicate kinds, and moderately all vigorous growers: in summer the ends of long vigorous shoots on standards or pillars should be pinched off. Propagate by buddings, layers, and cuttings, from June to November; graft in March. On Manetti or Celine stocks they are beautiful dwarf standards. They require high culture, plenty of manure-water, and a coating of mulch, covered with moss for appearances, and to prevent radiation.

XIV. *Tea-scented and China Roses* require little pruning. Thin out old wood about the end of March, and shorten to half its length, to encourage young shoots; propagate by budding, layers, and cuttings, from June till November. The tea-scented roses are more tender than the China, and require more care. On their own roots, and in moist soil, they require a raised bed, made of nine inches of brick-rubbish and 12 inches of garden-mould and rotted dung in equal portions, well mixed, adding a little river-sand. In this plant the bushes two feet apart. Protect in winter by green furze or other spray, which will admit plenty of air while keeping out frost.

XV. *Noisette Roses.*—Slightly shorten and train the shoots at their full length, and thin out in March; propagate by layers, cuttings, and budding, from June till September; graft in March. When done flowering, cut the shoots close to the ground to encourage others for next season. Tea-scented Noisettes are tender, and require a wall in a warm aspect, or a pillar well sheltered; the soil well manured, and stirred 20 inches deep.

XVI. *Scotch Roses* will grow almost anywhere, in any soil, in the crevice of a rock, or in a sandy soil, with plenty of air; they require little pruning, and bloom early in the season.

§ 4.—ROSE INSECTS.

1874. Early in the spring, when the amateur is eagerly watching for the earliest indications of a leaf on his rose-trees, he has the mortification too frequently of seeing the budding leaves glued back to back, and tied together with fine silken threads, giving to the cluster of leaves the appearance of a folded-up fan. This is especially observable near to towns, and if not checked at once will be fatal to his hopes of bloom on his roses. It is the larvæ of one of the bell-moths, *Tortrix Bergmanniana*, which, in their caterpillar state, are most injurious to the rose. The moth itself is a pretty little lepidopteron, the front of the body being of a rich golden yellow, clouded with orange, with four purplish-brown bars, the two middle ones running obliquely across the wings, which are also ornamented with silvery scales. The wing has a yellow ground, fringed with paler yellow, with a patch of silvery scale in the centre, the hind wings being blackish brown.

1875. The end of its being is to propagate its species, and as soon as it appears in June, it begins to deposit its eggs in the embryo buds of the rose-tree. The heat which develops the young bud hatches the larvæ; the outer leaves are forced out of their natural position, so as to form a nest for the eggs; the young caterpillar, when hatched, eats its way to the surface, devouring the lower parts of the petals of the flower, as well as the leaf.

1876. The caterpillar is of a dark flesh-colour, with a black shining head, and two black patches on the first segment of its body, the second and third being spotted with brown, and having six black short-jointed legs on the first segment, and a pair of short fleshy false legs on the last segment. When disturbed in its depredation, it has the power of dropping itself to the ground by spinning a thin thread from its mouth, by means of which it recovers its former retreat, when the cause of alarm has departed. When full-grown, it fastens the leaves round it by means of these threads, forming a web or covering, within which it throws off its caterpillar skin, and assumes the chrysalis state about the end of June. It is now of a shining reddish-brown colour, with transverse rows of short spines or hooks, directed backwards; their use being to assist, before it attains its perfect state, in pushing the body forward until the front part is exposed. When the time arrives, the moth is thus able to cast off the chrysalis skin, without having to make its way through the folds of the leaf.

1877. There are two seasons at which this pest of the rose-garden may be extirpated. On the first indications of them in the young leaf, pinch the buds sharply: this will destroy the larvæ, and leave the tree at liberty to throw out new leaves; again at maturity the moth should be caught by a hand gauze net, and destroyed before it has deposited its eggs. At other times the only remedy is hand-picking, and destroying them in the caterpillar state when they can be found.

1878. Another of the bell-moths, *Spilonata aquaria,* feeds on the rose-leaves. Its wings are ashy-white, with leaden or slaty-coloured clouds, with a broad triangular brown patch at the base, and a black spot towards the external extremity of the wing: it appears in June. The caterpillar fastens the leaves together, and forms its silken web between them, like the other, preparatory to its chrysalis state.

1879. The bedequar excrescence which is sometimes seen on rose-trees is the product of one of the gall-flies, *Rhodites rosæ,* and not a purely vegetable growth, as is sometimes supposed. The woolly exterior, on being cut open, shows that it is charged with slender lateral filaments, and the method of their growth is supposed to be produced by the puncture the female insect makes for the purpose of depositing her eggs; each of which becomes surrounded by a fibrous growth, affording sustenance to the larvæ when hatched. The history of the growth, however, is very obscure. It is evident that the sap of the plant is arrested in some manner, and diverted from its natural course, producing the excrescence in question. The insects producing this result are very small,—the sixth of an inch in length, black, with the abdomen glossy, and chestnut-red; legs red; antennæ black; the fore wings stained with brown at the apex. The larvæ are white fleshy grubs, destitute of feet; the pupæ somewhat resemble the perfect insect; the limbs inclosed in sheaths. They undergo their transformation in the cells of the bedequar, the insects eating their way through its sides. They are kept in check by several species of Ichneumonidæ and Chalcedidæ. There are several other species which affect the rose, some of them taking up their abode in galls already formed.

1880. Among the coleoptera, the rose-chaffers, *Cetonia aurata,* may be observed wheeling round the Roses, with a humming noise, and feeding upon their pollen, their lower jaw being furnished with an apparatus for brushing off the farina into the mouth. The larva feeds on decaying wood and vegetable matter: it appears in June and July, when it is unquestionably destructive to the rose, biting off the anthers. The grub, which appears in March with the first sunny days, feeds on the young leaves, and eats into the buds. As it feeds chiefly in the night in dry weather, it is difficult to catch while feeding; for on the least unusual noise it drops to the ground as if dead; by carefully moving the soil round the stem of the tree, it may be found just under the surface. A trap may be prepared for them by laying dry lumps of mould round the stem, with some pieces of tile on the top, in which the insects are sure to burrow.

§ 5.—VARIETIES OF ROSES.

1881. *The Scotch or Burnet Rose* is well known in its natural state, growing abundantly on all dry soils in Scotland, and many other countries besides. In character it is a compact bushy shrub, growing wild on the hill-sides. In gardens it soon attains a height of three or four feet, extending its branches at the base. The cultivated species were first raised in Messrs. Dickson and Brown's nursery at Perth. Struck with their appearance growing wild on the hill of Kinnoul, Mr. Brown transplanted some of them into his nursery in 1793. One of them exhibited a monstrosity, as if two flowers were growing on one bud, slightly tinged with red. From the seed of this flower a plant was raised, and by continuing to select seed from its progeny, in 1803 they had obtained eight good double varieties,—the *small white,* the *lady's blush,* the *red,* the *light red,* the *dark-marbled,* and the *large two-coloured;* and, what was most remarkable, the *small yellow,* and a smooth foot-stalked *lady's blush.* From this nursery Mr. Malcolm, of Kensington, procured his stock; whence they soon spread over the kingdom, many new varieties of extraordinary beauty being raised from them. In a monograph of the Scotch rose, by Mr. Sabine, a former secretary of the society, published in the Horticultural Society's Transactions, we find them divided into groups, derived chiefly from their colours:—

Of *Double White* there are four distinct varieties,—a small double, a large double, a large semi-double, and Whitley's double.

Double Yellows.—Only two are given,—the small double yellow and large double yellow; the first a pale sulphur, rather than a yellow; the latter of a dingy sulphur-colour, tinged with red spots on the outer petals.

The *Double Blush.*—Deserving of cultivation, are—1. the Princess; 2. Double Lady's; 3. Anderson's Double blush; 4. Dutch Double blush; 5. Double pink-blush and Double rose-blush; the first distinguished from the small double white, by being better cupped and more evenly-shaped; its flowers, at first opening, having a slight suffusion of blush. The second opens with a soft delicate blush, and goes off white, its large elegant petals slightly dashed with red. The third is pale in the bud, expands well into a flat semi-double disk. The fourth appears to have come from Holland,—whence its name. The bud is a delicate pale blush, the flower large, semi-double, and opens well, a faint blush pervading the petals, which are large and recurved, the colour going off on exposure to the sun. The fifth is one of the earliest in bloom, the flower semi-double, the petals uniform pink, fading after the flower has been opened a short time. The sixth is very double-cupped, the petals arranged closely together, of a fine rose-colour, which is deepest on the edges: it is the latest bloomer of the double Scotch roses.

The *Double Reds* are three in number,—1. the true Double red; 2. the Double light-red; 3. the Double dark-red. The first is middle-sized, opens well; the petals much notched and reflexed, of a fine rose-colour on the inside, getting paler and nearly white as it approaches the edges; a fine tall rose, blooming plentifully, and opening early. The second is more cup-shaped, but less brilliant in colour, and tinged with purple. The third is well cupped, semi-double; the inside of the petals dark rose-colour, the backs a uniform pale purple, having also reticulated veins, turning to marble on going off.

The *Double Marbled* include three varieties,—1. the Double light; 2. the Double crimson; 3. the Double dark. The first is a very handsome rose, of moderate size, with crumpled carmine petals, mottled on the inside, with reticulations of white veins, getting gradually paler from the centre, and the edges becoming paler as the flower goes off, until it is nearly white. In the second, the petals are beautifully marbled with lake and white, the reticulations showing their white veins over a deep purple. The third,—the semi-double flowers open well, are very brilliant; the petals mottled inside with deep purple-lake, on a pale ground; the backs of a deep colour, variegated with white lines;—the most beautiful of the whole tribe, sometimes called the *Double velvet.*

The *Double two-coloured Roses* have the petals of distinct colours on the two surfaces,—the inside dark, the outside pale. As the buds open, the petals turn back, the dark colour of the inside being thus placed in strong contrast to the paler colour of the exterior. In the small double, the bud is at first tinged with purple; as the flower expands, the petals are notched, their edges revolute, the inside brilliant lake, mottled with dark shading, and the outside almost white. The Large double, or King of Scotland, is much larger; the petals pale outside, and of a uniform deep lake on the inside. Both flower late in the season.

The *Double Dark-coloured* includes the light-purpled, the petals of which are of a dingy-coloured reddish purple, paler on the back, and notched, and revolute on the edge. The double purple flowers late, but is very distinct, the petals upright and cup-shaped, their interior dark lake, inclining to purple, the backs lighter, but of the same colour. The Double crimson is of a dark reddish brown in the bud; the petals, when open, of a deep crimson inside, without marbling, but showing reticulated veins; the back less brilliant, but altogether a rich and handsome flower.

1882. This section of roses are usually grown as bushes, and they bloom with great abundance, most of their small globular flowers hanging on the bush like so many balls, and many of them early in the season. They are admirably adapted, from their hardihood, for planting as a hedge round the rosery, or on a bank. When established in the soil, they push out their roots laterally underground, and throw up suckers, which recommends them for a rose hedge. This also renders them easy of multiplication by suckers: their general habit is dwarf, and their spines are both numerous and well-pointed.

1883. An interesting group of hybrids have been produced between the damask perpetuals, to which Mr. Paul gives the name of Scotch perpetuals. "Among them the Stanwell is," says Mr. Paul, "the only one really worth attention. It is among the first to unfold its blossoms, flowering in May, and throughout the summer and autumn, till arrested by frost: it is deliciously fragrant. Some say it has the fragrance of attar of roses; but it appears to me more to resemble the Provençal: its flowers are rosy-black, their centre often pink, large, double, and cupped; of branching habits, and raised at Stanwell." Under the head of Scotch roses, Mr. Paul gives a list of seventy-six hybrids from the Stanwell and the Scotch perpetuals, ranging from the pure white of Aimable étrangère to the purple Countess of Kinnoul; from the yellow Mary Stuart to the straw-coloured Mrs. Hay, with many marbled and striped varieties.

1884. *Ayrshire Rose.*—The rapidity with which this rose covers a wall or pillar, added to its intrinsic beauty, renders it invaluable to the gardener; indispensable, indeed, to him who would sing with the poet,—

"Not a pine in my grove is there seen
But a woodbine entwines it around."

For where its growth is encouraged, it climbs to the summit of the tallest trees, from which its long graceful shoots hang in festoons. The Ayrshire seems to have been first grown in the garden of the Earl of Loudon, at Loudon Castle, Ayrshire. It soon got into the nurseries in Scotland, whence, in 1811, it was transplanted to London by Mr. Ronalds, of Brentford. It was at first considered a variety of *R. arvensis,* afterwards of the Evergreen rose, *R. sempervirens.* It differs in many respects from both; its long slender branches grow so rapidly as to throw out shoots thirty feet long in one season. *R. arvensis* never grows with this rapidity, and its branches are stronger and thicker. The Evergreen rose still less resembles the Ayrshire in these properties.

1885. There is more than one tradition connected with the introduction of this rose; that which is most likely to be authentic being supported by Mr. Reilly, who states, in his monograph in the *Edinburgh Philosophical Magazine,* that the seeds from whence it was obtained were part of a packet received from Canada, from which several plants were produced. Another tradition traces it to a Mr. Power, from Yorkshire, who brought the plant from some gentleman's garden in that county. Whatever of truth there may be in either of these accounts, it is pretty certain that no rose having the slightest resemblance to the Ayrshire has since been discovered on the American continent. It also appears that at different periods, two very distinct varieties have been grown in the nurseries under the same name; one being descended from *R. arvensis* and the other from real Ayrshire, with very long slender branches, so weak as to require support, being so tender and flexible as to hang down perpendicularly from the last joint, where they are nailed or tied, the shoots become greenish brown when ripe, slightly tinged with purple when young; the side-branches numerous, and covered with leaves, so as to form a thick, dense mass of foliage; flowering abundantly all July, generally in clusters of three, and on very vigorous shoots of from ten to twenty cream-coloured flowers; the petals being large, expanding, flat, and the edges lapping over each other; the stamens numerous, and bright yellow, with very agreeable odour.

1886. This is the hardiest of climbing roses, and its cultivation and management is very simple. Layers of its long pendulous shoots root readily, and it strikes easily from cuttings; it will grow rapidly where others will scarcely exist, and when placed in good rich soil, its growth is so rapid that a large space is covered by it in the second season of planting. It forms an admirable weeping rose when trained on wires to that habit, on trellis, verandah, or alcove, on a bank, or in rough places of the park or shrubbery. The luxuriant growth of the Ayrshire soon turns a rough and dreary waste into a flowery bank.

1887. Like the other roses, the Ayrshire has yielded many hybrid varieties:—

Ayrshire Queen,—dark purple-crimson.
Bennett's seedling,—pure white; forms a beautiful pendulous tree as a half-standard.
Dundee Rambler,—white, edged with pink; well adapted for a half-standard for the lawn.
Ruga,—pale flesh-colour; very fragrant; a hybrid between Ayrshire and a tea-scented rose.
Splendens,—creamy white, approaching flesh-colour when full; crimson in the bud; large, double, and globular; one of the finest pendulous roses.
Queen of the Belgians,—creamy white; cupped, large and double; very sweet-scented.
Alice Grey,—creamy salmon-blush.
Countess Lieven,—creamy white; cupped and double; of medium size.

1888. *Evergreen Roses.*—The progeny of *R. sempervirens*, which abound throughout Europe in a wild state, is, like the Ayrshire, employed as a climbing and weeping rose. Its beautiful dark-green leaves grow on to the depth of winter, which has procured it the name, although it is, strictly speaking, deciduous. They are mostly trees of vigorous growth and abundant bloomers, adapted for pillar-roses; their small, but very double flowers, hanging in graceful cymes of fourteen to twenty on a branch. They require much thinning in the pruning season; the shoots left being merely cut at the points, the others cut close to the base.

Banksæflora,—creamy white, with yellow centre; cupped and double; produced in clusters.
Carnea grandiflora,—pale flesh-colour; large and double; cupped.
Donna Maria,—pure white, of medium size; full and cupped; a choice variety.
Félicité perpétuelle,—flesh-colour, changing to creamy white; produced in graceful trusses drooping from their own weight; a superb sort.
Myrianthes,—pale peach, the centre white; hanging in graceful trusses of full-cupped flowers; a fine pillar-rose.
Princess Louise,—creamy white, with black petals shaded with rose; large, double, and cupped; a fine climber.
Fortune's five-coloured,—creamy white, striped with carmine.
Fortune's double yellow,—bronze and yellow; large and very distinct.
Rosea major,—rosy flesh-colour, changing to white; large, double, and cupped, with fine glossy foliage.

1889. *Banksian Rose.*—The flowers of this elegant rose are produced in small umbels, each of three, four, up to twelve flowers, at the extremities of small lateral shoots, branches of the preceding year's growth. The peduncles or stalks are slender and smooth, and about an inch and a half long, so that the flowers have a drooping habit when fully expanded. The scent of the flower is agreeably fragrant, not unlike to that of the sweet violet. This delicate rose was imported from China in 1807, and was named in compliment to Lady Banks. It was long treated as a greenhouse plant; but in 1813 two plants were turned out into the open ground at Spring Grove. In two years, although one of them died, and was replaced, they had covered both walls against which they were planted. In 1818 and 1819 these plants had covered forty feet of wall, each shoot producing at its extremity an umbel of flowers, which began to open in April, and the whole wall was covered with blossoms until the middle of June. This vigorous growth and bloom was produced by planting it in a rich sandy loam, and against a wall with a south or west aspect, nailing its shoots close to the wall; and when the wall was completely covered to the extent proposed, cutting away all the strong shoots as they appeared, leaving only those intended to produce flowers in the following spring. From August to February the only care required is to nail in all young shoots, only removing them where they are superabundant.

1890. *Perpetual Roses* have been so crossed that their real origin is very indistinctly known. A French author, quoted by M. Boitard, traces their wood and spines to the old Damascus roses, their leaves and foliage to the Bengal, their clustering flowers to the Bourbons, and their odour to Centofolio; proving, as M. Boitard observes, if all these characteristics be true, the correctness of his opinion on the question of species. Mr. Paul divides them into groups; founded—I. on the Four Seasons rose, "a branch of the Damask now little known, and chiefly valued as the type of the lovely Damask Perpetuals." II. the TRIANONS, a group formed by M. Vibert, of Angers, "obtained," as he tells us, "from several varieties which acknowledge the Rose de Trianon as their type." The flowers of this group are produced in small clusters, flowering in the summer; the leaves gathering in tufts near the end of the shoots. A third group—III. the DAMASK PERPETUALS, "chiefly descended from the old monthly and Four Seasons rose; the varieties being more remarkable for the delicious fragrance of their flowers than for their size or symmetry of form; but which," he adds, "are more properly described as Damask roses blooming in autumn." The fourth group—HYBRID PERPETUALS. These lovely additions to the rose-garden have been raised in great part by M. Laffay, between the Bourbons, the Chinese, and the Damask. "Princess Helena was the first introduced in 1837; Queen Victoria followed; and in 1840," says Mr. Paul, "there were above twenty varieties enumerated in the rose catalogue, one-fourth of which, however, were Bourbons." "The others might be called," adds Mr.

Paul, "hybrid Chinese blooming in autumn. They are, indeed, fine roses, quite hardy, and very sweet. They thrive under the common treatment, and are suited alike for standards and dwarfs, for pot-culture and forcing.

1891. The following lists give a few of the best varieties of *Hybrid Perpetual Roses*:—

Earl of Derby,—scarlet, flowers deep rose, tinted with purple; large and semi-double, producing a fine effect in the summer—partaking of the Four Seasons.

Baronne Prevost,— bright pale rose-colour; glossy; a very large, full, and compact flower; strong, vigorous free grower, blooming freely from June till November. Always opens its blooms well, whether in the heat of summer or the cold damp weather of November. Well suited for a large clump. A most magnificent rose.

Dr. Marx,—rich glowing carmine-colour; large and full-cupped flower, and very fragrant; strong, robust grower, opening its flowers freely both in summer and autumn. Will make a splendid dark mass. A very beautiful rose.

Géant des Batailles,—dazzling crimson, the nearest approach to scarlet in this class; very free grower, and one of the most abundant bloomers, flowering from June till December, and invariably opening its flowers well. It will contrast well with any of the light flowers which follow. A bed of this under a bright sun is almost too brilliant for the eye to rest on.

La Reine,—brilliant glossy rose-colour, shaded with lilac, and sometimes with crimson; cupped and very large; has the appearance of a true perpetual cabbage, but much larger; strong, robust grower and free bloomer. This, like Baronne Prevost, forms a magnificent clump: a grand flower, well worthy of its name.

Madame Laffay,—bright crimson, inclining to purple; large, cupped, and very double; very fragrant; free, vigorous grower, and an abundant bloomer from the end of May to the middle of December: expands its flowers well, and never fails to give them in abundance. One of the most useful roses, and admirable for a clump.

Standard of Marengo,—brilliant crimson.

William Jesse,—light crimson, tinged with purple; very large, double, and cupped; a large and fine flower; strong grower: forms a splendid mass.

1892. *The Bourbon Rose*, a variety of *Rosa indica*, was discovered in the Isle of Bourbon in 1817, by M. Breon, who flowered it and sent the seeds to M. Jacques, at Château de Neuilly, near Paris. It was growing among a lot of seedlings raised to form a hedge. This parent of a numerous and lovely progeny, graduating from pure white to the darkest tints, has been hybridized with the Chinese, with the Noisette group, and with other Bourbon roses; and in the latest edition of Mr. Paul's "Rose-garden" they number 251 varieties.

1893. The distinguishing characteristics of Bourbon roses are brilliancy and clearness of colour, large and smooth petals, falling in numerous and graceful folds. They are perfectly hardy, and thrive under the ordinary culture, delighting in a rich soil, like most of the roses, and requiring close pruning, except the more vigorous kinds. They are of slow growth, however, in spring, and thus they are best adapted for autumn-flowering roses.

1894. "The kinds of vigorous growth," Mr. Paul tells us, "form handsome umbrageous trees, with heads as large as summer roses; they also look chaste and elegant trained on pillars. The moderate growers are pretty as dwarf standards. The dwarfs form striking and beautiful objects when grown on their own roots. A great many are excellent for pot-culture, and are beautiful objects in the forcing-house."

1895. The following list embraces the best varieties of the Bourbon; those marked * partaking of the Bengal rose, *R. indica*:—

Sir Joseph Paxton,—flowers bright-rose, shaded with crimson; large, full, and cupped, with fine foliage.

Comice de Seine-et-Marne,—flowers open crimson-scarlet, changing to rosy purple; produced in clusters, very double and cupped. One of the most beautiful of the group for standards, but surpassed by another raised from it at Lyons in 1852.

Mrs. Bosanquet,—creamy white; a profuse bloomer from June to November; moderate grower. This rose appears to be intermediate between the Chinese and what are called Bourbons. Will form a small clump, if possible, more unique and beautiful than any other variety. A truly splendid rose.

Bouquet de Flore,—brilliant carmine; opens freely, and blooms profusely from June to November; a strong, vigorous grower, and admirably adapted for massing. A China striking rose, and suitable for pot-culture.

*Comte d'Eu,—brilliant carmine, very strong, and continues to bloom well through the summer and autumn; a moderately strong grower; forms a lovely bed, being distinct and very good.

Cérès,—a pale glossy rose, of compact form and thick petals; very large and double, of fine habit, and well adapted for pot-culture.

Paul Joseph,—a rich crimson-purple, shaded sometimes with fiery red; of large, full, and compact form, suitable for a dwarf or dwarf standard.

Proserpine,—a bright velvety crimson flower, of medium size and compact form; of dwarf habit.

Madame Souchet,—a rosy blush, margined with red or lake; large and very double, and compact in form.

Armosa,—deep pink, of full form and medium size, partaking of the Chinese; suitable for a standard or for pot-culture.

Amenaide,—flowers lilac rose-colour, produced in clusters; large, full, and cupped, partaking of the Noisettes.

Charlemagne,—flowers a clear blush, changing to pink; large and very double, and cupped.

Julie Deloynes,—flowers flesh-colour, cupped, very double; small, white, and sweet-scented, changing to white; partaking of the Noisette.

Apolline,—flowers silvery rose-colour, shaded; large, full, and cupped. A fine autumnal climbing rose.

Prince Albert,—fine scarlet-crimson; large, full, and cupped.

*Enfant d'Ajaccio,—scarlet-crimson, very bright; a moderately strong grower. Its only bad quality is that it will not open well in hot summer weather; but in autumn it is truly brilliant. The rains of October appear not to affect it in the least. Very beautiful and good.

Georges Cuvier,—rosy-crimson, tinted with light purple; fine shape, expands its blooms freely; a moderate grower. Distinct autumnal rose, with large, full, and compact flowers, with beautiful foliage.

*Grand Capitaine,—velvety fiery scarlet, very brilliant; opens its flowers both in summer and autumn. Not very double; dwarf habit; well adapted for a small bed, where the intense brilliancy of its flowers will show to advantage. One of the most distinct of roses.

Pierre de St. Cyr,—glossy rose; fine, large, double-cupped flower; expands well, and blooms profusely; a most robust grower. Will form a splendid clump to contrast with any of the strong-growing hybrid perpetuals. As a weeping rose it forms a splendid umbrageous tree, blooming through the summer and autumn.

Queen,—fawn-colour, shaded with salmon; very sweet-scented flowers; large, double, and cupped. One of the first and last in bloom, invariably expanding its flowers well, which appear in profusion. Rather dwarf habit, but will form a lovely small clump. Distinct and beautiful.

Souchet,—purplish carmine, sometimes a brilliant crimson; a large glossy flower, of full and compact form, and a good dark variety. A moderate grower, expanding its flowers with freedom. Superb.

Souvenir de la Malmaison,—white at the margin, approaching to flesh-colour, or fawn in the centre. Very large and magnificent flower, with very thick petals, blooming freely through the summer and autumn: a strong grower. This will make a gorgeous clump in contrast with such roses as Baronne Prevost, La Reine, &c.

1896. *Boursault Rose* owes its name to M. Boursault, an eminent French cultivator, and is a cultivated variety of the Alpine rose. The shoots are very long, flexible, and smooth, in many instances entirely without spines, and the eyes are further apart than in most other kinds. The flowers are produced in clusters suitable for pillars, and from their naturally pendulous habit they may be trained to form weeping roses. They should be well thinned out in pruning, but flowering-shoots should only have the points cut off. Mr. Paul describes the following as blooming from May to July :—

Amadis,—deep crimson-purple, shaded with lighter crimson; large, semi-double, and cupped; the young wood whitish-green.

Black Boursault,—flowers whitish-blush, with deep flesh centre; very double and globular; of pendulous habit; excellent as a climbing rose in a good aspect.

Drummond's Thornless,—opens a rosy carmine, changing to pink; flowers large, double, and cupped; habit pendulous.

Elegans,—flowers in clusters of semi-double rosy crimson; sometimes purplish, often streaked with white; erect in habit, and suitable for a pillar.

Gracilis,—flowers early; cherry, shaded with lilac-blush; full-formed, and cupped; of branching habit; spines long and large; foliage a rich dark green.

Inermis,—rosy-pink, becoming pale when expanded; large and double, and of branching habit; shoots spineless.

Old Red Boursault,—opens a bright cherry, becoming paler gradually; large and semi-double; of pendulous habit; a showy pillar or weeping rose.

Banksia,—flowers pink; a very early bloomer.

Weeping Boursault,—flesh-colour, like the blush; of a pendulous habit, and suitable for a weeping rose.

1897. *Chinese Roses.*—The first introduction of the Chinese roses dates from 1789, in which year both the Monthly rose and the Crimson Chinese were introduced. The varieties which have sprung from these are innumerable. They have also been hybridized extensively with the tea-scented. Unlike other roses, also, the Chinese roses get a deeper and more brilliant tint by exposure to the sun. "Archduke Charles, and some other Chinese roses," Mr. Paul tells us, "are distinct and beautiful as variegated roses; they expand rose and white, soon become mottled with, then change entirely to, crimson, from the action of the sun's rays."

1898. "The Crimson Chinese are beautiful when the autumn is mild," says Mr. Paul; "a few cold misty days occurred in 1846 to obscure their brightness, when warm weather succeeded, and the buds which the wet and cold had sealed suddenly expanded, producing a brilliant show in November. All are of branching habit and moderate growth. There are some beautiful blood-coloured roses among them. Some do not thrive as standards, but all luxuriate on their own roots, and form pretty interesting objects budded on dwarf stocks. They thrive best in a rich soil, with close pruning," and produce a plentiful bloom throughout the summer and autumn. It is the progeny of *Rosa indica,* having a common origin, as some authors think, with the tea-roses, so called from their fragrant odour, and the Bengal roses. The most remarkable crimson varieties described by Mr. Paul are,—

Abbé Mioland,—flowers reddish purple; often streaked with white; globular, and very double.

Alba,—flowers white, tinged with straw-colour; double, and well-cupped.

Augustine Hersent,—flowers pink, very double, cupped; a free bloomer, suitable for massing.

Carmin de Yébles,—flowers deep carmine, double, cupped; a very pretty rose, unique in form.

Duchess of Kent,—flowers creamy-white, often edged with rose; very pretty and distinct; small, full, and cupped.

Eugène Beauharnais,—flowers amaranth, beautiful in the bud, dying off into dark crimson. One of the hardiest roses of the dark varieties, a free grower, and splendid in a clump.

Fabvier,—flowers crimson-scarlet, semi-double, expanded; a brilliant showy rose in masses.

Louis Philippe,—flowers dark crimson, edges of the centre petals nearly white; globular, and full.

Reine d'Angleterre,—flowers crimson, tinged with purple; cupped, and very double.

Prince Charles,—flowers brilliant crimson, often suffused with light purple, full, and cupped.

1899. Of the monthly Chinese rose the following are very beautiful varieties:—

Anteros,—flowers white, tinged with sulphur, creamy centre; cupped, large and full; partaking of the tea-scented.

Archduke Charles,—light-rose, margins almost white, changing to brilliant crimson; a profuse bloomer; moderate grower. One of the best changeable roses. Unique.

Belle Ferronnière,—flowers blush, with flesh centre, often tinged with pink; cupped, large, and double; excellent for massing.

Bourbon Armosa,—a bright pink.

Bourbon Angelina,—pale cream-colour, fawn in the centre.

Caroline de Berri,—flowers flesh-colour, tinged with fawn, and cupped.

Clara,—flowers white, with creamy centre, but petals often rosy; large, full, and cupped; good forcing rose.

Clara Sylvain,—pure white, cupped, large and full; a superb flower, flowering freely from June till the end of October; moderate grower, suited for a small bed, and the best white for the purpose. Beautiful.

Chénédole,—flower a brilliant crimson; large, superb flower; magnificent for a standard, making long and vigorous shoots.

Cramoisie supérieure,—a beautiful rose, of bright velvety crimson.

Eugène Hardy,—flowers white, centre blush-colour; of medium size, full, and cupped; of drooping habit, and does best as a standard.

General Soyez,—flowers cherry-crimson, very large and full, cupped; a beautiful autumn rose.

General Jaquemont,—flower purplish red, of very perfect shape: have taken prizes at the recent flower-shows.

George IV.,—flowers deep violet-crimson; raised by Mr. Rivers; one of the oldest and finest of the class.

Grenadier,—flowers rosy crimson, changing to pale rose; large, full, and cupped.

Madame Bréon,—flowers rich rose-colour, sometimes tinged with salmon; very large, full, and compact.

Madame Bureau,—flowers white, the centre inclining to straw; large, double, and cupped. One of the finest autumnal whites.

Magna rosea,—flower light blush; a fine large rose.

Miellez,—flowers pale lemon, changing to white; of medium size, double, and cupped.

Reine de Lombardie,—flowers blush changing to rosy crimson; large, full, and expanded.

Rival de Pæstum,—flowers yellowish white; large and full.

Rubens,—flowers blush, lilac, and crimson; changeable; very large, full, and cupped.

Tancredi,—flowers light purple, suffused with crimson; variable, large, and cupped, with rich foliage.

Virginale,—flowers flesh-colour, of medium size; full, globular; requires forcing to bring out.

1900. *The Tea-scented Chinese Rose* is undoubtedly the most desirable group of roses which has come under our notice. Its odour is delicious, and closely resembles in bouquet the flavour of high-class teas; their colours are generally subdued in tint, being white, creamy-white, flesh-colour, and yellow, except where they have been hybridized with others of more brilliant colours. The blush tea-scented rose was introduced from China in 1810; ten years afterwards, the yellow was imported; for we find Mr. Williams, a corresponding member of the Horticultural Society, reporting upon it in 1823, after he had cultivated it for three years. "Three years ago," he says, "I had buds of the double yellow, as well as some of the dark and of the sweet-scented Chinese roses, inserted on strong shoots of a musk cluster-rose, which is trained on the east front of my house. Last year both Chinese varieties flowered in great beauty during the whole season, the dark Chinese particularly well, the flowers being much larger than when grown on its own roots. My buds," he adds, "were inserted ten feet from the ground ; and Mr. Knight thinks the large size of the blossoms is owing to the distance the sap has to pass before it reaches the flower-buds." The progeny of these roses are remarkable for their thick petals and the extreme delicacy of their colours, which are generally, as we have said, of neutral tints.

1901. It was long said by writers, both French and English, that the yellow Chinese produced few hybrids worth cultivating ; and this opinion prevailed pretty generally, until the finest of the whole group was raised by Mr. Foster, of Plymouth. This was Devoniensis, a fine creamy-white, with buff centre : others from the same parent soon followed, partaking of the Noisette roses, with some of which probably Mr. Foster had hybridized.

1902. Mr. Paul divides tea-scented roses into two classes. The LIGNEOUS, or more woody kind, are much hardier, and form good standards. The other, which he calls HERBACEOUS, not that they differ in their fibre, but because they are more tender and require more delicate treatment. "If trained to a south-east wall," he says, "the tea-roses grow vigorously, and flower in great beauty, much earlier and much finer than in the open ground, producing a constant succession of flowers during one half of the year. They also flower freely in pots and plunged in the open ground, so as to be removed to a cold frame for protection during winter. The practice of removing them from the ground for protection during winter," he adds, "and again transferring them to the rosarium in spring, cannot be too highly deprecated. To remove a plant once endangers its growth and flowering the following year ; and to remove it twice, more than doubles the risk of failure."

1903. To grow this group in perfection, therefore, requires considerable knowledge of their habit as well as care, and they are peculiarly adapted for that kind of pot-culture which has so flourished under the fostering care of the Horticultural and other societies who have admitted roses in pots into their programme of prizes within the last few years. In the open ground they all require a rich well-drained soil, close pruning, and the means of protection from frost in winter. As ornaments to the conservatory they are unsurpassed. "At Orleans House, Twickenham," says Mr. Paul, "the vigorous growers are trained up wire pillars to the height of 12 feet; the flowers, drooping with their own weight, are displayed to great advantage ; their elegant and shining foliage is kept on during the greater part of the winter, and nothing could be more appropriate,—nothing more beautiful."

List of the hardier Tea-scented Roses.

Niphetos,—creamy white, approaching to lemon, the centre lemon-colour ; magnolia-like ; large, full, and globular ; a beautiful rose.

Belle Marguerite,—flower rose, shaded with crimson ; large, double, and well-expanded.

Bride of Abydos,—white, delicately tinged with pink ; large and double ; a free bloomer.

Caroline,—blush, suffused with deep pink; large, cupped, and full.

Comte de Paris,—flesh-colour shaded with rose; full and cupped.

Mansais,—rose, shaded with buff; ver large, full, cupped, and sweet.

Corinna,—delicate wax-like flesh, sometimes fawn in the centre; very double.

Goubault,—bright rose, the young buds opening a rich deep crimson as the sepals open; very large, double, and expanded.

Original,—creamy white, centre salmon-buff; large and full.

Pauline Plantier,—white, tinged with lemon; globular and full.

Princesse Hélène,—white, yellowish centre; large, full, and cupped.

Safrano,—saffron-yellow to apricot-colour in the bud, changing to pale buff; cupped, large, and double.

Taglioni,—creamy white, centre flesh and lemon; large, full, and cupped.

Gloire de Dijon,—fawn, tinted with salmon and rose; small, fragrant, and of vigorous growth.

Nisida,—rose and fawn; shaded, double, cupped, and very sweet.

1904. Of the more tender varieties, the following list contains those most worthy of cultivation:—

Devoniensis,—creamy white, tinted with rose-buff, sometimes yellow in the centre; very large, full, cupped; a splendid rose, beautiful in the clump.

Adam,—rosy salmon-colour; very large, full, globular, and fragrant, with camel-like petals; suitable for a small mass.

Aurora,—cream-colour, centre yellowish; large and double; of vigorous growth.

Bougère,—glossy bronze rose-colour, approaching to deep salmon; cupped, large, and full; a robust grower.

Canary,—true canary-colour; semi-double, charming in bud, but forces very pale.

Clarisse,—pinkish white, changing to creamy white; full, and medium size.

Eliza Sauvage,—cream-colour, approaching to pale yellow, sometimes with deep orange, inclining to buff in the centre; large, full, and globular: a delicate rose, of dwarf habit. The best yellow for a small bed.

Hamon,—flesh-colour, variable up to crimson; large, double, and very sweet.

Homer,—white, tinted with rose and fawn; very large, and somewhat variable.

Josephine Malton,—rich cream-colour, centre often inclining to buff; tops of the petals sometimes tinged lake-colour; large, double, and cupped; of exquisite fragrance, but delicate.

Julie Mansais,—straw-colour, margins white; large, full, and cupped; sweet, and rather delicate.

Louise de Savoy,—pale yellow; globular; very large and double.

La Renommée,—white, centre pale lemon-colour, sometimes mingled with flesh; cupped, large, and double.

Marie de Medicis,—flesh-colour, tinged with rose and carmine; large, full, and globular.

Madame Villermoz,—white, salmon-colour in the centre; a recent and very fine rose.

Cant's Aurora,—a rich cream-coloured rose, tinged with buff in the centre, with full and finely-formed petals, supposed to be an old kind generally lost; although Mr. Cant, of Colchester, has grown it for twelve years. Beautiful blooms exhibited in 1861, cut from a south wall.

President,—flower blush, tinged with salmon-buff when young, becoming blush when older; a large, well-cupped, and newly-formed rose, of free growth and hardy character.

Moiré,—flesh-colour, shaded with pale fawn; very large and beautiful rose.

Prince Esterhazy,—flesh-colour, centre rose; very large, double, and globular, and delicately sweet.

Rêve de Bonheur,—yellowish, shaded with rose; very double.

Souvenir d'un Ami,—salmon and rose-colour, shaded; cupped, large, and full; a fine rose.

Triomphe du Luxembourg,—flesh-colour, tinged with fawn and rose-colour; very large, full, globular, and fragrant.

Vicomtesse Decazes,—yellow, deeper in the centre; shaded copper-colour; very distinct and beautiful; large, double, and cupped.

Ajax,—yellow, colour deepest in the centre, outer petals spotted with rose; large, full, and globular.

Madame de Hardelay,—clear sulphur-yellow; large, full, and cupped; of vigorous growth.

Jeanne de Gironde,—yellow petals; very thick, sometimes bordered with rose-colour.

1905. *The Moss-Rose.*—The origin of the moss-rose is buried in obscurity, and all that can now be said of its past history is, that it was introduced into England from Holland; the general belief being that it is an accidental sport from the Provence rose,—"Not by seed, as most new varieties are," Mr. Paul surmises, "but by a branch of the Provence rose sporting; that is, producing flowers differing in character and habit from others of its own nature, and enveloped in moss. Some tribes of plants are more disposed to sport than others, and Provence and moss-roses possess the peculiarity in a remarkable degree." In support of this view, Mr. Paul adds: "I have seen the white moss bearing at the same time, and on the same plant, red, white, and variegated flowers. I have also seen the perpetual moss, whose flowers should be white, produce pink flowers entirely destitute of moss. I am informed, and think it probable, that the Moss Unique was first obtained from a branch of the white Provence rose, which produced flowers enveloped in moss; the branch was propagated from, and the plant so propagated produced flowers retaining the mossy character." The origin of the moss-rose de Meux, as recorded by Mr. Hare, a former assistant-secretary to the Horticultural Society, probably explains in a satisfactory manner how similar varieties were produced. "In a shady and neglected part of a garden belonging to Mr. Penny, of Taunton, a common rose de Meux had long flourished near to a common moss-rose. In 1801, a healthy young sucker of this rose de Meux, corresponding in all its characters with the parent stock, was observed to be clothed with moss in every respect like the common moss-rose. It received due attention from the possessor, who regarded it as an elegant variety, and as it excited the admiration of visitors, several were presented with layers, and one or more of these was transported to Guernsey. From Guernsey, Mr. Hare conjectures it reached Paris, and was imported thence by Messrs. Lee & Kennedy, by whom it was generally believed to be the first of the kind ever seen in this country."

1906. The cause of this *lusus naturæ* Mr. Hare endeavours to trace with little result. The rose de Meux has never been known to mature seed in this country; therefore he rejects the notion of accidental impregnation with the moss-rose growing beside it. The moss-like excrescence, known as the bedequar or rose-sponge, has been suggested as an origin for the mossy character; but the filaments of the bedequar are essentially different from the moss of the rose. But he suggests that this moss may possibly be an altered form of the spiny processes, produced by a superabundance of resinous matter stimulated by moisture and shade; resinous matter forming a considerable portion of the moss, and each main fibre appearing to proceed from a pore, being afterwards subdivided into many fibrillæ. "The stem and branches of the earlier offspring of the Somersetshire rose had more of the common character of plants grown in the shade than those imported from France; a more humid and greener appearance, as if the gummy resin contained within were more diluted and aqueous."

1907. This interesting incident probably explains much of the mystery in which the origin of this and many other roses is shrouded. It is by no means conclusive, however, to say that the parent rose de Meux never having been known to mature seed, fecundation did not take place. A very warm summer, or a flower more than usually exposed to the influence of the sun, might have produced seed; and some accidental circumstance might have produced impregnation with the pollen of the common moss-rose. It is, at all events, quite certain, that of the 160 species into which botanists divide the *Rosaceæ*, or the eleven sections into which Dr. Lindley divides them, none are more distinctive in their character than the moss-rose; and it is not without very good reason to support their views, that some authors consider it a distinct species, although it is more generally classed as an offshoot from *Rosa centifolia.*

1908. The moss-rose above all others requires a warm rich soil, with an airy exposure; moisture and shade also seem essential to their preserving the mossy character; but this moisture must not partake of the stagnant character. To insure a fine autumnal bloom of moss-roses, Mr. Rivers tells us, the soil should be deep and rich; if not so naturally, they should be lifted annually or biennially, and replanted with some rich fresh compost at their roots. When grown as standards, they should be budded on the dog-rose; but they do best budded on short stems or on their own roots, and pruned close. Grown on deep, rich, and warm soils, the more vigorous sorts may be fashioned into "pillar-roses." "What will our readers say to a pillar formed of the old red moss reaching to the height of 15 feet?" says Mr. Paul. "Such a one exists, I confidently assert, in the garden of Mr. Anderson, Ball's Cross, Cheshunt, growing within a few feet of the road. When I examined it, some of the shoots of last year's growth were above six feet long, and extremely robust, and the main stem had swelled to a considerable size."

1909. The following list gives a few of the best moss-roses, selected from Mr. Paul's list and Mr. Rivers' catalogue:—

À feuilles luisantes,—flowers delicate, pink-blush on the circumference; of medium size; full and globular; blooming freely in clusters, with shining leaves.

Alice Leroi,—flowers lilac-blush, shaded with rose, the centre a deep rose; large, double, and well massed and cupped; thrives as a standard, pruned close.

Celine,—flowers deep rosy-crimson, shaded with purple, a streak of white occasionally tracing the centre of a petal; colour brilliant when nearly opened. Thrives well as a standard.

Old Moss,—flowers pale rose; very large and full, well massed and globular; very beautiful. Thrives as a standard.

Comtesse de Marinais,—flowers pale flesh-colour when newly opened, changing to white; large and very double. The only white moss (according to M. Vibert) ever raised from seed. A fine standard.

Comtesse de Noé,—very brilliant crimson, changing to lilac as the flowers go off. Flowers in clusters of fifteen to twenty blossoms, each with a dark green shining foliage.

Eclatante,—flowers deep pink; well massed, large, and double. Thrives as a standard.

Etna,—flowers brilliant crimson, with a purplish tinge; large and very double. A beautiful rose.

La Diaphanie,—flowers rosy-blush; large, and very double; of pendulous habit; a free bloomer. Raised by M. Laffay between the moss and French rose.

Panachée Pleinee,—flowers white or flesh-colour, occasionally streaked with rose; of medium size, cupped, and very double. To bring out the streaks, plant in rather poor, but fresh soil, as turfy loam, giving a very little manure.

Pompon, or de Meaux—flowers blush, pale pink, centre small; full and cupped. The Taunton rose before mentioned.

Princess Royal,—flowers purple and crimson, beautifully mottled; large and double, cupped, and very showy. A fine standard.

Princesse Royale,—flowers rosy-flesh; large, full, and globular; well massed.

Unique,—flowers pure white, occasionally tinted with lake after expansion; large, full, cupped, and well massed.

White Bath,—flowers white, occasionally producing striped or pink petals; well massed; exquisite in bud; large and full. A beautiful rose, and the best white.
Adèle Pavie, — flowers delicate flesh-colour; large, full, and compact; of robust growth.
Arethusa,—flowers bright rose, shaded with lilac; large and full.
Cramoisie foncée—flowers crimson, shaded with vermilion; large, full, and cupped; of vigorous growth.
Duchesse d'Abrantes, — flowers flesh-coloured rose; large and full; of compact form. One of the best flowers of the kind.
L'Obscurité,—flowers dark velvety purple; large and semi-double; cupped.
Madame Alboni, — flowers blush, with pink centre; large and very double; bud well massed, and of vigorous growth.
Rosa Bonheur,—flowers pale-rose, centre bright rose; large, full, and globular.
Princess Alice,—flowers blush, pink centre; buds well massed; large, full, and compact; of very vigorous growth. A lovely rose.
Captain Ingram,—dark velvety blush.
Baron de Wassenaer,—rose-colour; very large, double, and finely shaped.
Madame Ory, — flowers rosy-crimson; large, double, and well-shaped. A beautiful rose, blooming freely in autumn.
Salet,—flowers rose; very double, giving out abundant buds in September, which have the true odour of the old moss.

1910. *Noisette Roses.* — This beautiful group of roses was originally a hybrid between the Bengal rose (*R. indica*) and *R. moschata.* It was sent from North America in 1817, by M. Philippe Noisette, to his brother, Louis Noisette, of Paris; and the letter which accompanied it states that it was obtained by the artificial fecundation of the former with the pollen of the latter, applied by camel-hair pencil. M. Boitard thinks this statement may be doubtful, pointing out how easily the hybridizer may deceive himself in carrying out the details of his operation. "Our cultivators," he adds, "obtain every day new varieties resembling the Noisettes by merely sowing the seed of *Rosa indica,* without any attempt at artificial fecundation." It is not very obvious, however, why this doubt is raised: it is quite certain that the original type of the Noisette is becoming scarce, while the new sorts approximate to other groups.

1911. To grow Cloth of Gold or its congeners freely, procure strong, healthy plants, budded on Celine or Mannetii stocks in spring; plant out on a south wall, on a properly-prepared border. If the soil is naturally good, enrich it with good rotted dung, having the border previously well drained. Should the soil be indifferent, dig it out to the depth of 18 inches or two feet, and replace it with rich turfy loam, mixed with well-decomposed cow-dung, in equal proportions, and a little leaf-mould. Every ten days in summer give it a good soaking of liquid manure, and as the growth proceeds, nail the shoots closely to the wall, and stop all shoots at 15 or 18 inches, by pinching off the points. Many, both of the stopped and unstopped shoots, will bloom freely. In cold situations protection should be given in winter. Spring pruning should not take place till the end of March, when all danger from severe frost is past. At this time prune hard, cutting out and shortening back considerably all old wood, to induce vigorous growth. In the following season give the same attention to pruning, watering with liquid manure. The south wall will be found greatly to facilitate the ripening of the young wood ni autumn.

Aimée Vibert,—pure white, blooming in immense clusters; very showy. There being a scarcity of good white autumnal roses, this will be found useful to group in contrast with the strong-growing Bourbons and perpetuals in large clumps, using Clara Sylvain, with more dwarf varieties, in smaller beds.

Narcisse,—pale lemon; a beautiful flower, blooming in abundance. This is a tea-scented Noisette of moderate growth, and rather tender, requiring slight protection. Will form a beautiful small clump. A very first-rate rose.

Ne plus Ultra,—creamy white; fragrant; dwarf habit; blooming in large clusters. Like Narcisse, a tea-scented Noisette, but more hardy than that variety. Will contrast admirably with any of the dark dwarf varieties, such as Grand Capitaine. A very desirable and beautifu rose

Ophirie,—bright golden-salmon; a strong grower, blooming in rich abundance from the early summer till the approach of frost; even the wet and damp of autumn appear only to give a deeper tint to its lovely flowers; indispensable, from its colour, for a large clump where this colour is wanting. The other yellows which are free bloomers are of too delicate growth, and only adapted for small beds. Pegged over a large clump, which it should be, it forms a unique mass in the flower-garden. Fragrant and very distinct.

Fellenbourg,—of a bright rosy crimson.

Miss Glegg,—a beautiful white, with pink or pale rose centre.

Victoriense,—a delicate blush; very beautiful.

Cloth of Gold,—a clear yellow; large, beautifully formed, and fragrantly tea-scented; adapted for a south wall.

1912. The *Austrian Briers*, and other yellow roses, are difficult to flower, and require careful management. The old double yellow is remarkably capricious, and the Cloth of Gold, or Chromatella rose, in which rose-growers expected to find an unrivalled yellow, blooms in perfection only in very few places. "The general directions given," says Mr. Saul, of the Durdham Downs nursery, Bristol, "is to grow it in a poor soil, as it is a strong grower. Now, this I consider very questionable advice. It belongs to the group of roses called Noisettes, many varieties of which have been crossed and raised from very dissimilar groups. The large section of tea-scented Noisettes will be found to differ most materially from the original Noisettes, from their affinity to the tea-scented from which they have been raised. To this section belong the Cloth of Gold, Solfaterre, Clara Wendel, Lamarque, Triomphe de la Duchère, and many other fine roses; Solfaterre being very little inferior to the Cloth of Gold, both being raised from the same parents. The whole section require peculiar treatment, approaching in some degree to what we give to the strong-growing tea-scented kinds.

1913. "Under the starving system, I have seen the Cloth of Gold so semi-double, small, and worthless, that, without positively knowing it, I should have doubted its identity. It is a shy bloomer under this system, covering a considerable space of wall, and standing year after year without producing a solitary bloom. I have seen it producing magnificent blooms from buds of the previous season if budded on strong stocks, as the Celine and Maneti rose. These buds, after having been headed back the first season, when 15 to 18 inches long, should have the leading points pinched out, when the laterals will generally bloom abundantly in the autumn. On the dog-rose stem, growing standard and half-standard high, I have bloomed it freely in the same way; not that I recommend it for a standard, for it is unsuited for the purpose; but should any one wish to try it in that way, he should protect the head from extreme cold in winter, pruning hard in spring, and applying liquid manure liberally in spring and summer, stopping all shoots at 15 or 18 inches, to induce the lateral shoots to bloom."

1914. *Pompon Roses* (*R. Lawranceana*).—These beautiful little gems of Flora are admirably adapted for bedding-out purposes, from their singularly pleasing and distinct colours, and the admirable contrast they present. The beds for these delicate roses, where they are confined to one variety, should be small, as, indeed, should be the garden. They are best adapted for a fairy garden, which should be well drained; otherwise the roses could not survive the winter. Whatever the soil, the beds will be improved by its being removed to the depth of 18 inches to two feet and replaced with a layer of stones, and brick-and-lime rubbish, for drainage. If the natural soil is pretty good, it may be returned, after mixing it with a portion of decomposed cow-dung, adding a small portion of sand, the whole thoroughly blended together; or rich vegetable mould full of fibre will do.

1915. These roses are recommended to be on their own roots, and to be planted in autumn. The stocks on which they are usually budded are too gross for their delicate structure. Plant them 15 inches apart if it is intended to peg them down, so as to cover the bed; if they are to stand apart so as to exhibit their tiny proportions, 18 inches will be better. In March, or early in April, when all danger from frost is over, they may be pruned, using the knife sparingly,—cutting out all dead wood, and regulating the branches. is all that will be required.

1916. As the season advances, water them from time to time with weak liquid manure, removing all decaying leaves; and where they have bloomed in clusters, cut back to the next bud, from which they will again break, and bloom in the autumn. Short shoots, showing no bloom, should have the terminal buds pinched off on attaining the length of five or six inches; the lateral shoots thrown out will probably bloom freely.

1917. During the winter keep the buds as dry as possible; they are even worth protecting from the cold rains. We venture to class a few of the most favoured suitable for bedding:—

ROSE-COLOUR, Clementine Duval,—flowering from May to November, every shoot terminating with a bunch.
„ General Merlin,—flowering the whole summer and autumn.
„ Léonie Verger,—rather delicate, but a free flowerer.
„ Pompon,—small, but extremely pretty; blooming in clusters.
„ Psyche,—bright pink; blooming freely in clusters; very neat and pretty.
CHERRY-COLOUR, Coquette de Montgomery,—shaded with violet; a very free bloomer; with its earliest shoot it begins blooming, and continues through the season till November.
PURE WHITE, Pauline Bonaparte,—small, but distinct and pretty; contrasting admirably with all the others.
CRIMSON, Nemesis,—very deep colour, blooming in clusters through summer and winter.
„ Crimson,—a miniature China; the best we possess for edgings, being perpetually in bloom, and a free grower.
„ Jenny,—miniature China, continually in flower, and very pretty.

CARMINE, Pompon de St. Rudegonde,—brilliant purplish; a strong grower, and good-sized flowers.

BRIGHT YELLOW, Pactolus,—a tea-scented rose, blooming in clusters very freely; an admirable rose.

1918. All these roses may be grown in pots with advantage for blooming in spring. In March they require a moderate shift, using good fibrous turfy loam and cow-dung. Protect them in a cold frame; water occasionally with manure-water, and pinch off all buds and shoots when about four inches long, and give another shift during the summer. In September they will become bushy plants, ready for shifting into their blooming-pots, which must not be large, using the soil already recommended. Keep them in a cold frame through the winter, giving very little water. In spring, apply manure-water, and prune as recommended for out-of-door culture.

1919. The kinds for which this treatment is most appropriate, in addition to the above, are—

The miniature China (*Alba*),—a pure white; rather too delicate for out-of-door growth; a very pretty bloomer.

OCTOBER

CHAPTER XXXIII.

MONTHLY CALENDAR.

§ 1.—ASPECT OF THE MONTH.

1920. THE eighth month from March, the first month of the old Roman year, October, according to the quaint old Peachum, "is drawn in a garment of yellow and carnation; upon his head a garland of oak-leaves, in his right hand the sign of Scorpio, and in his left a basket of 'services,' medlars, and other fruits that ripen late." The mean temperature of the month is nearly 7° lower than that of September, and frost is by no means uncommon towards the end of the month. The moisture in the atmosphere increases, and evaporation diminishes considerably; the mean average temperature being, at one foot below the surface, 51·52°; at two feet, 52·78°; and at the surface, 49·35°.

1921. The autumnal fall of the leaf, with the change of colour which precedes it, is among the most interesting phenomena of the month. That the latter is due to light was established by the experiment of Mr. Macaire Prinsep, who found that the exposed part of the leaf was always the most deeply-coloured portion. In order to determine whether any change of colour took place in absolute darkness, he shaded parts of the branch of a tree, the leaves of which were in three different stages of colour, and found that no further change took place,—a green leaf fell off green; a leaf yellow before seclusion fell off yellow; if variegated, the leaf fell off green, yellow, or brown. Seclusion from the light seemed to arrest the natural change which was going on under the action of the sun; but the cause of colour in plants is somewhat obscure. The decomposition of carbonic acid, and the exhalation of oxygen, is productive of a green colour in a ratio proportioned to the intensity of the decomposing cause—light. On the other hand, where water is present in too great abundance in the system, yellow prevails, as if the blue, which is necessary, with the yellow, to produce green, were discharged by the surplus moisture, while the green becomes intense in proportion to the action of light and air. The fall of the leaf itself is a phenomenon not very easily comprehended. "It is not enough," says the author of "Observations of a Naturalist," "to say that the leaf falls because it is weakened or dead; for if a branch is struck by lightning, or detached from the stem by any other cause, the leaves still adhere tenaciously to the dead branch. To produce the natural fall of the leaf, in deciduous trees, the branch must continue to live, while the leaves die." It is only when it has satisfied the ends of its being, that it is discharged, as it were, from its functions; the sap, which it was called forth to elaborate, is consolidating into wood; and the leaf, no longer required, returns to earth to restore its exhausted powers. It is, therefore, a melancholy sight to witness the falling leaf. We are irresistibly reminded of the holy text,—"We all do fade as a leaf." In spite of these solemn associations, awakened by the season, however, the varied hues of autumn are beautiful to look upon: all that rendered summer green and lovely is dying by the wayside; but in its place we have a universal and peculiar serenity of atmosphere, a more intensely shining sky, and an impression of ampler expansion; an array of sunny clouds with their silvery lining, the distant horizon, and a landscape of unequalled variety and richness of colouring.

1922. The garden, it is true, begins to look somewhat desolate; flowers which bloomed a few weeks ago—bloomed in numbers innumerable—are now "few and far between;"—but some still linger with us, the plaintive question of the poet notwithstanding, who asks,—

> "Where be the violets gone,
> Those of late that bloom'd so gay?"

1923. Dahlias, before the close of the month, are probably touched by frost, and the chrysanthemums and the autumnal roses are the chief ornaments of the garden on which reliance can be placed; but most of the other denizens are only on sufferance. The first frost will play sad havoc with them, except where they occupy very warm and sheltered spots in the garden. Even there,—

> "They daily await without terror or grief,
> The summons that tells of the fall of the leaf."

§ 2.—SHRUBBERY AND FLOWER-GARDEN.

1924. The great business of propagating for next year should now be consummated. Nevertheless, such things as verbenas, calceolarias, &c. &c., may still be put in with the certainty of success. Sometimes these plants flower so freely that it is almost impossible to get suitable wood for cuttings until the end of September or beginning of this month. It is almost useless to try to strike pieces of the hard flowering-wood,—the small young shoots, *heeled* off from the flowering branches, constitute the proper cuttings. It is better to wait until now for these than to attempt striking the others in August or September. The cuttings cannot well be too small if they are long enough to admit of one end being made firm in the soil, and a brace of leaves to breathe in the air; neither is it of the slightest importance whether the leaves at the bottom of the cutting are removed or not, as far as the rooting is concerned. My own opinion is, their retention favours the emission of roots. However, the more leaves retained, the more carefully must damp be guarded against in winter, and the greater care must be exercised to guard the cutting, through the preliminary stages from cutting-wood to plant-wood, from an excessive exhaustion of its juices by perspiration. The very effort, however, to perspire causes a circulation of fluids; and the stronger this current, consistent with vitality, the mightier is the force with which the cutting gravitates towards life instead of death, while its juices continue in active stagnation, or semi-death prevails. When the sap moves, life begins to assert its sway. The leaves are the great agents in maintaining the circulation of the sap; consequently, the more there are retained on a cutting, the more rapid will be the motion of its fluids, and the sooner MAY roots be emitted—I don't say MUST. This rapid motion of the sap is in favour of life, but it may result in death, illustrating the old proverb, "The more haste the less speed." Rapid circulation is good, provided there is a supply to be conveyed; but if a current throughout a plant, or part of a plant,—that is, a cutting, is maintained, without the addition of new matter,—the period of utter exhaustion, ending in death, will be in exact ratio to the rate of speed. Hence the importance of checking perspiration by a humid atmosphere, and maintaining a proper balance between the supply and expenditure of the organizable or life-extending, organ-forming matter of the cutting. Free perspiration from geranium-cuttings is useful, because they contain more fluid than is necessary to sustain their life until new matter is formed; and the motion of the fluids it induces helps to form such new matter. The same, or half the amount of perspiration, would wither up and destroy verbena or calceolaria cuttings, because they contain less fluid, and are more delicate and fragile in their texture. The juice of the former may, therefore, be freely and liberally expended; the juice of the latter must be carefully husbanded, to guard against death from exhaustion. The whole theory and practice of propagation by cuttings, therefore, turns upon a careful, wise husbanding and expenditure of the sap and organizable matter stored up within the cutting itself. As a rule, the softer the texture of the cutting, the faster it will gravitate towards death, and, of necessity, the more rapidly must the process of rooting be pushed forward; and the harder the texture, the longer the period of probation given, and the slower the process of rooting. All successful practice demonstrates the correctness of this theory; and it is as important to bear it in mind in providing flowering plants as in the higher branches of propagation. It is a good practice to put calceolaria cuttings into cold pits at once, thus:—Place six inches of broken brickbats, stones, and charcoal, for drainage; another four inches of rough leaf-mould, or well-decayed light manure; on the top of this, three inches of soil, composed of equal parts loam, leaf-mould, or peat and sand. Spread over the surface one inch of clean sharp silver or other sand, press it down firm with a spade or other contrivance, and water well to consolidate and settle the whole. Next day commence inserting the cuttings two inches apart, taking care to plant them firmly; water the surface, which should have an inclination of three inches from back to front, in a pit seven feet wide, until it is even, and the process is complete. Keep the glass on; shade in bright weather, and give scarcely any air for a fortnight. By this time the cuttings will be partially *callosed*, and may be gradually exposed to more air and full sun-light. In a month or six weeks they will be well rooted, after which the glass should be entirely removed, unless during rain, fog, or frost. During winter they must be protected from the frost by a covering of mats or straw. They will require very little water from November to the middle of February. About this period they will begin to grow rapidly, and may either be potted or kept as cool as possible in the pit, and finally transferred to the flower-garden in the middle of May. This is the most successful mode of propagating and storing calceolarias. The maintenance of their roots in an equable, cool, and moist condition, is the grand secret of success. To have good beds of calceolarias it is also indispensable to strike a sufficient stock in the autumn. They will strike readily enough in the sharp heat in the spring; but spring-struck cuttings seldom flower so well, can scarcely be got forward enough to flower early, and, if subjected to a high temperature, are almost sure to take themselves off suddenly without leave, leaving yawning vacancies behind, at a time when it is often impossible to replace them. For ease, simplicity, and certainty of success, autumn is the season for furnishing the entire stock of calceolarias. Geraniums may also be kept in the same manner, but not without extraordinary precautions against damp. I keep several thousand in wooden boxes 30 inches long by 10 wide, and 5 deep. The sides are nailed to the bottom at one end; the other end is hooked on to the sides with two hooks formed of bent wire. Two short nails passing up one inch through the bottom, and piercing into holes formed in the movable end, keep it firm and strong in its place. The bottom of the box, which is all formed of rough $\frac{3}{4}$-inch stuff, is pierced with six holes, half an inch in diameter. The boxes are prepared for use by placing one inch of hard drainage in the bottom, then an inch of rough leaf-mould, 1½ inch of light soil, and half an inch of sand over all. Press down firm, water, leave to settle, and then insert three rows of fifteen cuttings, or forty-five in each box, and place in the bright sun until they are rooted. They will only require water, weeding, and picking over, until they are housed for the winter. Keep them dryish during that period, and, if you can afford space and pots, remove them into single pots in February or March ; but if not, keep them as cool as possible; harden them off early in the spring ; remove the boxes to the flower-beds in showery weather in May, and they will often succeed better, and grow more kindly, than those that have been coddled up in pots, &c. &c., for months. But I have not yet told you how to transfer them, for you must not plant the boxes far asunder, as they will serve the same purpose for five or six years; and although I like thick planting, forty-five plants (you have no business to lose one) to the 300 square inches would be too much of a right good thing. Well, then, unhook the movable end, place a spade, cold chisel, or screw-driver under, to prise it off the bottom studs, and then pause a minute to admire that mass of roots; run the spade along the bottom of the box, bringing up drainage and all together in one solid mass ; break the soil to pieces with your hands, leaving a lump of roots and soil about two inches square to each ; carefully plant, leaving the roots dispersed throughout the soil, and not twisted round into a small hole like a wisp of straw ; water well as you proceed, and my word for it each plant will have begun to grow before you can get the next one inserted.

1925. This plan is more economical in labour, space, first cost, and working, than pots. Where these are not primary objects, the single plant in pot system has a good deal to recommend it in the greater safety with which the plants can be transferred to the ground in dry weather, without the risk of check. Neither does the box system answer so well for anything except geraniums, ageratums, and the Lobelia fulgens class.

1926. I could not succeed with petunias nor verbenas in boxes. *Gazania splendens,* I almost forgot to say, did well in boxes. I have tried many different sizes of pots and pans for verbenas. I have found nothing so useful or successful as a score of cuttings in a 48-sized pot. The pots are filled one-third full of drainage, one inch of rough leaf-mould over it ; then fill to within 1½ inch of the top with equal parts of loam, leaf-mould, or peat and sand, finishing with half an inch of sand ; insert the cuttings in the usual manner, making sure that the *base* of the cutting is made firm. Water *level*—a point of great moment in excluding the air from the part where roots are to be emitted, as well as in the future watering of the cuttings,—and the work is finished. Verbenas are also best left in the store or cutting-pots until February ; and, unlike calceolarias, if enough is kept over the winter for stock, spring-struck plants are best both for growth and flower. This last remark is equally applicable to petunias, ageratums, lobelias, &c. Verbenas and other soft-wooded plants may also be struck in water; but I see no benefit whatever in the practice. I may also state, for the very few who do not know how to make a cutting, that the usual practice is to cut part of a branch level across at the base of a single leaf or pair of leaves, to remove this leaf or leaves, and place this part, the bottom or thick end of the cutting, in the soil, water, or damp moss, until it is rooted. Great importance is attached to the manipulation or dressing of the cutting. As far as cutting it level across at a joint is concerned, I believe this is useful, although by no means indispensable. The removal of the leaves is of no consequence whatever: it may hinder, it cannot possibly accelerate, the emission of roots; and with most flower-garden plants it is a sheer waste of time.

1927. But, having said so much about how to propagate, I will now give a few hints about what to propagate. What?—only the best varieties of everything. Oh! the newest fashion, say you?—these are beyond our means.—Nothing of the sort; I mean just the contrary. How many new things, or dear things, did you notice in my lists of flower-garden plants, or plants for ribbon-borders? Perhaps one or two new geraniums, and *Gazania splendens*, which is probably as old as the hills, and as cheap as any bedding-plant in the world. New, indeed! No, no. Generally, the usefulness of a plant for bedding is in the inverse ratio of its newness. Novelty is all right and proper in its way and place; but in these pages sterling worth is the main consideration. I here condense for the million, what I have handled, seen, and proved, of floral beauty, and therefore what must look well in their gardens. What will you propagate?—Rely on any or all the plants enumerated in the foregoing lists? These are not enough.—Well, then, we will give you some more, although these furnish gardens many acres in extent.

1928. I myself grow two thousand Purple King verbenas, one thousand White Perfection and Mr. Holford, five hundred Robinson's Defiance, and from a dozen to a thousand of the following varieties:—

Ariosto,—dark mulberry.
Blue Bonnet,—blue.
Admiral Dundas,—bright crimson.
Fire-fly,—rich scarlet; fine habit.
Lord Raglan,—carmine-scarlet.
Mrs. Woodroofe,—scarlet.
Géant des Batailles,—brilliant crimson.
General Simpson,—carmine.
King of Verbenas,—rosy purple.
Moonlight,—nearly white.
Parfum de Madeline,—lilac.
Reine des Amazons,—blush.
Impératrice Elisabeth,—finely striped.
Pulchella alba,—white.

1929. The following are also good useful varieties:—

Snow-flake,—good white.
Fairest of the Fair,—white; violet eye.
Earl of Shaftesbury,—blush-crimson; white eye.
Prince Arthur,—rose, shaded.
Rosea compacta,—pure lake.
Mrs. Elphinstone,—puce tints; fine.
Foxhunter,—scarlet; white eye; fine.
Ariosto improved,—rich mulberry; robust habit; large truss; continuous and fine bloomer; good bedder.
Sultana,—rich crimson; good tinge.
Invincible,—shaded slate-blue.
Garibaldi,—rich indigo.
Julie,—pale peach; white eye.
Cupid,—cerise pink; white eye.
Ocean Pearl,—purple; white eye.
Odorata,—superb rosy purple.
Star,—deep rosy crimson; lemon eye.
Titian,—plum, shaded cerise.
Volunteer,—dark purple maroon; white eye.

1930. Of geraniums, again, I grew four thousand improved Frogmore scarlet; two thousand Mangles' silver, variegated; five hundred French scarlet; about the same number of Browne's compactum; nearly a thousand Flower of the Day and Alma; with quantities varying from three hundred to a dozen of the following varieties:—

Scarlet shaded and Spottishall,—varieties.
Trentham rose,—fine rose.
Baronne Souget,—fine scarlet.
Cerise Unique,—cerise.
Emperor of the French,—scarlet.
Christine,—rosy pink.
Auber Henderson,—white.
Madame Chardine,—salmon-rose, white centre; large.
Minnie,—pink; white spot on upper petals.
Paul l'Abbé,—clear rosy salmon; fine.
Richmond Gem,—light orange-scarlet.
Tom Thumb,—scarlet.
Tom Thumb's Bride,—good scarlet.
Garibaldi,—bright scarlet, with white eye.
Countess of Bective,—deep salmon, with dark brown zone.
Comte de Morny,—rosy scarlet; blush edges, suffused with pink; fine.
Shrubland,—scarlet; fine large.
Defiance,—larger still.
Harkaway,—deep habit; perfect bloomer; very distinct.
Rose superbe,—fine rose.
Dawn of Day,—brilliant scarlet.
Boule de Feu,—fine scarlet.
Madame Vaucher,—white.
Boule de Nuge,—white.
Henri de Beaudot,—very large; salmon-coloured blossoms, belted with white.
Lady Middleton,—fine rose.
Rubens,—fine salmon-colour.
Imperial crimson,—mossy.
,, Stilta,—ditto.
Purple,—ditto.
Red,—ditto.
Carmine,—ditto.
Silver variegated,—ditto.
,, Stilta,—ditto.

1931. Silver and gold varieties, one thousand:—

Golden Tom Thumb.
Golden Cerise,—unique.
Cloth of Gold,—unique.
Alma,—scarlet flower; silver lines.
Annie,—scarlet; sulphur-tinged.
Bijou,—strong-growing scarlet flower; silver leaves.
Brilliant,—slightly silvered; good scarlet; fine bedder; not a strong habit.
Countess of Warwick,—scarlet; white margin; leaves brown-white.
Culford Beauty,—scarlet flower; sulphur variegated.
Silver Queen, — pink flowers; smooth foliage.
St. Clair,—pink flowers; silver habit.
Miss Emily Domville,—salmon flowers, silver zoned; good.
Hendersonii,—like Flower of the Day, but scarlet flowers.
Perfection,—scarlet flower; white-margined leaves.
Rainbow,—scarlet flowers; silver, with red zone.
Dandy,—a neat silver-edged gem.
Lady Plymouth,—ditto, ditto.
Gold Ivy-leaved.
Silver ditto.
Pink-flowered ditto.
Scarlet-flowered ditto.
White-flowered ditto.

1932. To these may be added two splendid varieties raised by my talented friend Mr. Greene, of Culford, as soon as they are cheap enough to be brought within the grasp of the million. Pinset and Mrs. Pollock are two magnificent varieties, of free, robust habit. The green leaf-disks are overlaid by a beautiful bronze-red zone, splashed or belted with bright-red crimson, and margined with rich golden yellow. They are magnificent varieties, similar in habit and character, and are now being sent out from the large house in the Wellington Road, at 7*s.* 6*d.* and 31*s.* 6*d.* respectively. There are about a dozen varieties of the Diadematum, half a dozen of the Unique class, and several other sweet-scented varieties; one of the easiest managed of which is Shrubland Pet, that are extensively used for bedding in some gardens. But as they require special treatment, and more labour and care than most of my readers can give, I will pass them over at present. New varieties, or old varieties with new names, are also constantly coming up; and any or all of them may be grown instead of the improved Frogmore or Tom Thumb, if they *are as good.* Only secure the best possible scarlet for general purposes, and adhere to it until it is decidedly superseded by a better. I am not able yet to say whether Little David or the Crystal Palace scarlet geranium supersedes either of the above. Of this I am quite certain, that for general effect no variegated geranium yet equals the Mangles' variety. Therefore, I grow it by the thousand, while others are grown by the *score.*

1933. In Petunias, again, it is best to adhere to a few distinct, well-defined varieties,—the old or some improved variety of white,—such as the Bride rose, with white eyes. The Countess of Ellesmere and Lady Emily Peel, for violet rose, are among the very best varieties. The following are also good :—

Brilliant,—fine velvety rich crimson.
Eclipse,—distinct and novel.
Rosy Circle; good rose-coloured bedding variety; better than the Queen, which is also good, and of similar character.
Prince Albert,—crimson.
Prince of Wales,—crimson, often blotched, and edged with white.
Crimson King,—a good bedder.
Fascination,—white circle; bright rose; good habit for bedding.

1934. Of Calceolarias, the best are the following :—

Amplexicaule,—fine lemon.
Angustifolia globosa,—yellow.
Angustifolia superba,—deep yellow.
Aurea floribunda,—best yellow.
Aurea multiflora,—yellow dwarf.
Crimson King,—brown crimson.
Golden Prince,—fine bedder.
Kentish Hero,—orange buff; very good.
Coccinia floribunda,—good.
Garibaldi,—rich plum-colour.
General Havelock,—fine crimson.
Prince of Orange,—fine orange-brown.
Red Prince of Orange,—fine bedder.
Wellington Hero,—bright yellow.
Integrifolia,—fine yellow.
Viscosissima floribunda,—fine.
St. Alban's Pet,—orange-red.

1935. In addition to all these, the following species must be propagated :—

Agathea cœlestis.
,, ,, variegata.
Ageratums.
Anagallis.
Antirrhinums.
Bouvardias.
Centaureas.
Cerastiums.
Cineraria maritima.
Fuchsias.
Gazanias.
Heliotropiums.
Koniga Alyssum.
Lantanas.
Lobelias.
Nurembergæ.
Œnothera macrocarpa, &c.
Pentstemons.
Phloxes.
Salvias.
Senecios.
Stachys lanata.
Tropæolum elegans, &c.
Vincia elegantissima, &c.

1936. This list will furnish a pretty safe and correct answer to the inquiry what are we to propagate ?

1937. We will now take a rapid run through the shrubbery and pleasure-ground, and note if any, and what changes are to be effected there. Beeches, &c., 20 feet or 30 feet high, are to be moved, to break the prevailing east wind, on the other side of the lawn. Lose no time, then, in preparing the holes, and getting all preliminaries arranged for a heavy job of transplanting. The sooner all deciduous trees are moved, the greater is the chance of success. If the weather continues mild, they will form fresh roots before the winter; and by the time that the spring excites to renewed growth, the roots will be sufficiently restored to perform their important functions without let or hindrance. Large evergreens may also be safely removed this month. Space forbids me to enter into details now. I trust to say something about how and what to plant next month. Turf-laying, and groundwork generally, will also be proceeded with. Where much has to be done, a great deal will be gained by beginning early.

1938. *Reserve Garden.*—Keep annuals, and other plants in beds quite clear. Plant off primroses, polyanthuses, violets, Iberis, and Arabis. Wallflowers may now be removed to flower-beds and borders, if these have been cleared of their summer occupants. Increase by division of the roots, such herbaceous plants as rockets, lychnis, &c., and plant them in beds in this department. Plant beds of narcissus, hyacinths, crocuses, &c., either for permanent flowering here, or for removal to the flower-garden afterwards.

1939. *Florists' Flowers.*—Place auriculas, polyanthuses, pinks, carnations, &c., if not already done, in their winter quarters. Give all the air possible to induce a quick growth. Gather hollyhock and dahlia seeds if ripe. Pot choice varieties of hollyhocks, and winter under glass. Pot up pansies for stores and flowering in pots. Plant out seedlings and put in cuttings. Prepare beds of good, light, fibrous, sandy loam for tulips, and have all in readiness for planting the main stock early next month.

1940. *Flower-Garden.*—Maintain scrupulous cleanliness, and continue the beauty here as long as possible. Prepare pots and space for potting or boxing the chief stock of geraniums, calceolarias, jasmines, &c. If frost should come, get everything you intend to save under cover directly, and proceed to store them away at your leisure. There is, however, no necessity for destroying the beauty of the garden until the frost does it for you. It is often annoying to observe the anxiety with which beauty is welcomed in June, and the recklessness with which it is destroyed in October; and yet its preservation now seems to me to be of as much, if not more importance, than its advent then. With ordinary caution and extraordinary activity, there is but little danger in allowing King Frost to wreak his first vengeance on the garden. By constantly removing dead flowers and leaves, our garden here was as gay as possible in the second week in November last year. One day it was enwrapped in summer loveliness; the next morning it was covered with a thick mantle of snow. All hands were concentrated on this point, and about a thousand plants were rescued in a single day. Neither were they any the worse of their cold white wreath. It was worth a special effort to have exhibited so much beauty at such a season. Summer thus impinged upon the domain, and shortened the reign of winter. The enlivening presence of the flowers postpones our lament for the summer, when, in the words of Miss Procter, we are compelled to exclaim,—

> "Moan, oh ye Autumn Winds!
> Summer has fled.
> The flowers have closed their tender leaves and die;
> The lily's gracious head
> All low must lie.
> Because the gentle Summer now is dead.

"Grieve, oh ye Autumn Winds!
  Summer lies low;
The rose's trembling leaves will soon be shed,
  For she that loved her so,
Alas, is dead!
  And one by one her loving children go.

"Wail, oh ye Autumn Winds!
  She lives no more.
The gentle Summer, with her balmy breath,
  Still sweeter than before,
When nearer death,
  And brighter every day the smile she wore.

"Mourn, mourn, oh Autumn Winds!
  Lament and mourn.
How many half-blown buds must close and die;
  Hopes with the summer born
All faded lie,
  And leave us desolate, and earth forlorn."

D. T. F.

§ 3.—KITCHEN-GARDEN.

1941. Towards the end of the month the asparagus-beds may be cleared of their haum, but not till it is yellow and the seed ripe, and a portion of the soil forked into the alleys; then mix some good manure with a little salt, and lay a good coating of it over the plants, covering the whole with the soil thrown into the alleys.

1942. *Celery.*—Earth-up as often as it becomes necessary, not only for blanching, but to preserve the plants from injury by frost.

1943. *Seakale* will now be ready to force towards the end of the month, either by removal to a forcing-bed, or by covering the plants with pots, and these with stable-manure on the beds.

1944. *Cardoons* should now receive a general earthing-up, choosing dry open weather for the operation, first gathering up the leaves and tying them together with a hayband. The peas and beans are now past; let the ground be cleared, and, where vacant, dug or trenched, or ridged up, so that it may have the advantage of fallowing from the sun and air, and salts from the snows of winter.

1945. *Carrots, Potatoes, and Parsnips,* are now at maturity. Dig them up and store for the winter, so as to protect them from frost. The three-onged potato-fork, with broad tines, rounded and blunt at the points, is a ell-known implement; it is usual, where the haum is strong, to cut off the ps, and by inserting the fork under the whole plant, turn the whole up in a mass, the potatoes being collected after the digger in baskets: they may either be stored in a suitable room, or stored away in pits in the open ground, properly drained and covered, first with a layer of earth, then with a thatching of clean straw, and then with soil sufficiently thick to protect them from the severest frosts.

1946. Small crops of *Mazagan Beans* may be planted, with a chance of their standing the winter, and coming in in May or June. A crop of *Early Peas* may be sown at the same time, either on a warm south border or under a fence, the early Hotspur-pea, being the best for the purpose. If the border is eight or ten feet broad, let the drills run across, and sow an inch and a half deep, and three or four feet asunder, and so arranged as not to come in front of the stems of the trees on the wall.

1947. A little *Carrot-seed* may also be sown on a warm border, with a chance of young carrots in spring.

1948. All the *Cabbage* tribes require the greatest attention this month in weeding and warring with caterpillars, which now begin to infest them.

1949. *Cauliflowers* sown in August will require pricking out, not less than four or five inches apart, where some kind of protection can be given them, either under a frame or hand-glasses ; those formerly pricked out and hardened off require planting out under hand-glasses to stand the winter, keeping the glasses close till rooted, and then support them on props two or three inches thick for air. Transplant *Cabbages* at the end of the month, choosing the strongest plants. *Coleworts* should now be planted out for spring use, and all the late-planted *Broccoli Cabbages*, &c., hoed, so as to loosen the soil and destroy weeds.

1950. Some *Lettuces* for a spring supply may be pricked out under a frame, though the hardier kinds will frequently stand the winter on a warm border. *Lettuce* and *Endive* formerly planted out now require tying up. Small supplies of small salading sow weekly in boxes. Keep winter spinach free from weeds, and thin off where requisite, leaving the strongest plants. Sow also a small patch of Short-top and Salmon *Radishes* in the beginning, and again towards the end, of the month. If the weather proves mild, they will advance, and be ready for drawing in November and December.

§ 4.—FRUIT-GARDEN.

1951. Planting fruit-trees should now be proceeded with if the necessary preparations are made. These preparations consist in draining and preparing stations, where planting in the open ground is intended, and preparation of the border where wall-trees or espaliers are to be planted. The most important point in planting, next to soil and subsoil, is to keep the collar of the stem at the surface of the soil, removing all diseased or bruised fibres, spreading the roots out carefully, and putting fine soil over them ; keeping the young tree firmly in its place by stakes, without lifting or treading upon the roots : the autumn rains will settle the earth about the roots better than any other means. Root-pruning should now be performed either by lifting the trees altogether, and replanting, or by digging a trench round them, and removing or shortening old roots of over-luxuriant or perpendicular growth.

1952. *Apples and Pears* are now ripening fast. Gather on fine days, taking care that the pears especially are tenderly handled. When laid in the fruit-room for a week, it should be carefully looked over : more fruit decays in the first week than for many weeks afterwards, and if not removed, it soon affects others.

1953. *Peaches and Nectarine-trees* should have all superfluous shoots removed, and the young wood left exposed to as much sun as possible, to ripen the shoots, on which the hopes of the following year depend. As soon as the leaves part readily from the branches, sweep them off, but not violently, with a new birch-broom. The trees will be benefited by passing a light broom over the foliage in the direction of its growth. It will detach the ripened leaves, and admit air to the heart of the tree and branches. Root-pruning, if thought requisite, perform towards the end of the month. The sign of its being required is found in over-luxuriant foliage, with an absence of fruit; but it requires to be done with caution. Dig a trench round the tree, one, two, or three feet from the stem, according to its size, so as to lay open all the roots. All old roots which have ceased to throw out rootlets or spongioles, should be pruned away close to the stem, the young roots trimmed, and all having a tendency to tap-root, or descend too deep, should be cut away. This done, fill up the trench with suitable fresh soil or compost. Where extensive root-pruning is necessary, it should be done partially in two or three years, removing a portion of the objectionable roots on each occasion.

1954. *Plums.*—In wet seasons gather the late sorts, with their stalks attached; suspend them in the fruit-room; or, wrapt in thin paper, they will keep for several weeks. Quinces, medlars, and all sorts of nuts, are also now fit to gather.

1955. *Raspberries* of the autumn-bearing kind should now be bearing a good supply of fruit. If the weather be fine, the canes which have fruited should be cut out, and the young ones left three or four to a stool: then manure, and dig between them, leaving the young shoots their full length until the spring. New plantations may now be made; the improved mode being to plant single canes about 18 inches apart, and attached them to espaliers.

1956. *Strawberries.*—Remove all runners from the plants, and manure and dig between the rows; using the three-tined fork so as to avoid injuring the roots. Runners may be bedded out for new plantations, the formation of which should now stand over, however, till the spring.

1957. *Gooseberries and Currants.*—To grow these favourite fruits in perfection a deep and tolerably rich soil is required; and preparatory to planting, this should be deeply trenched and manured with thoroughly-rotted dung. Both are propagated by cuttings, which should be well-ripened wood of last year's growth, slipped from the tree, and from 10 to 12 inches long. Having selected the slip and separated it from the parent stem, cut off the top, leaving four shoots: trim off all others. Make two or three incisions, penetrating half through the stem, to expedite the process of rooting, and plant the cuttings in a nursery-bed in rows a few inches apart each way. When the cuttings have made roots, transplant them into a bed of deeper and richer soil, pruning back the four shoots to five or six inches, and leaving two side shoots to each. Here they may remain a second year, the four shoots now multiplied to eight, and the head beginning to assume its permanent shape. This is produced by means of hooked sticks, by which straggling shoots are brought into cup-like form, and forked twigs, by means of which shoots inclining inwardly are pressed out to their proper position, which should be as nearly the horizontal as possible.

1958. In the autumn of the second year the bushes may be planted out in their permanent stations, which may be from three feet and a half up to seven or eight feet apart, according to circumstances; that is, if it is a plantation entirely devoted to well-selected bush-fruit, in which no other crop is to be cultivated, three feet and a half, or four feet, will do. Where they are planted with the intention of growing other crops between them, six feet to eight feet will not be too much. Where they are planted in rows to divide the quarters of the kitchen-garden, six feet will probably be a convenient distance. In planting, dig out the soil eighteen inches deep, and of sufficient diameter to admit of the growth of the roots; smooth and level the station with the back of the spade, and drive a stake firmly into the ground in the centre, leaving it six or seven inches above the surface of the soil. Having trimmed the roots of the bush, place it in the centre of the station with the roots radiating in all directions, regularly spread out, none of them spreading over others, and sprinkle two inches of the soil over them, pressing it gently all round into the roots; over this spread a thin layer of well-rotted dung, and fill up the whole to the level of the surrounding soil. This done, water the roots well, and prune back all the shoots so as to form a cup-like bush, with branches radiating from the centre.

1959. Gooseberry and currant bushes produce their fruit both on the young wood and on the wood two, three, and four years old; and generally along the branches. The general bearers, therefore, young and old, of proper growth and well ripened, must be continued as long as they remain fruitful, cutting out from time to time such as are of irregular growth or too crowded,—all branches and decayed wood, together with the superfluous or over-abundant young wood of last summer; but retaining a selection of young shoots where necessary, to fill up gaps in the tree; the rule being, to keep them trained to a single stem below, while the head, or general expansion of branches, is kept open and regular.

§ 5.—The Culture of Flowers under Glass.

1960. The first, and, in many places, the chief duty of the month, is to see that all tender and all hardy plants intended to be bloomed in winter are placed under the requisite shelter. Nothing injures the former, or prevents the perfect inflorescence of the latter, more than being exposed to the chilling drenching rains that often fall at this period of the year. A day or two of such untoward influences will do more harm than months of exposure to genial balmy air and invigorating dews have done good.

1961. It is good practice, in fine weather, to place out, in sheltered situations, many of our heaths, azaleas, camellias, &c. &c.; but better far to keep them entirely under glass than leave them out too late in the season. If plants were only endowed with the gift of speech, what a hubbub there would be by many a sheltered hedge, sequestered nook, and sunny wall, during this month, —what outspoken criticisms and satirical onslaughts upon man's boasted knowledge of plant-life would be heard. How intensely sceptical they would one and all be concerning our affection and esteem for their fragrance and beauty. "Deeds, not words," we submit, is what they would exclaim in angry chorus. "It must either be the perfection of ignorance or cruelty to leave us starving here in the cold October blast, while our winter home is pale with the excitement of new paint and whiting to bid us welcome in. Had He who made us and bade us enwrap the earth in a fragrant mantle of beauty foreseen the perversity or stupidity of our masters, He would have added to His other great and good gifts the gift of locomotion, and made us alike independent of your fussy indulgence and tardy help, where help is most needed."

1962. Well, they are all safe at last, and a blush of beauty mantles over every inch of flowers, and leaves an expression at once of remorse for unkind thoughts in the past, and of gratitude for present favours.

1963. But are they safe? "Why, yes; I never saw them look better. Only the pots seemed heavy—the surface-soil somewhat greasy—with an occasional elevation here and there, as if a mimic Vesuvius had been upheaving its semi-liquid strata, and some of the leaves had a bluish, slightly-shrivelled, highly-polished appearance. But upon the whole,—I say upon the whole or part either,—no symptoms could be worse. Unless the greatest vigilance and skill are at once brought to bear upon the plants, patches of dead and dying leaves, lingering disease, and sudden deaths, will be the winter *enjoyment* in reserve for you. All healthy root-action has been paralyzed by the combined influence of water and worms. By their disintegrating and disorganizing forces, both the quality and texture of the soil have been changed. While in the open ground, worms are efficient drainers enough; one of the great results of their presence in pots is to render all drainage impossible. They first grind down the soil into small particles, and then work this finely-comminuted earth down among the drainage. This peculiar process blocks up the outlet for the exit of water, and speedily converts the wet composts into sheer mud. Not only the mechanical texture, but the chemical composition of soils thus water-logged and worm-worked, become so changed as to totally unfit them for the sustentation of plant-life. The roots are gorged with crude food, and kept in a dirty bath of muddy water. No wonder, then, at yellow leaves, drooping flower-buds, and sickly hues, ending in death. Keen winds, and heavy, dashing, cold rains or hail, are almost equally injurious. Their influence is less seen and more irremediable at the time; but it is equally potent afterwards. Those blotches, patches, and bruises, so common on leaves and tender branches of plants in winter, mostly originate from keeping them out too late in the autumn. Nothing can possibly be gained—much, yes, everything, may be lost—by the practice. Every prudential, sanitary, and economical consideration, urges the propriety of early housing. The plants themselves will express their gratitude in that best and most expressive of all language—a look of perfect health, made manifest by glossy foliage and handsome flowers. They will adorn your houses in winter with a summer wreath of beauty, and in the fulness of their gratitude transform their fair proprietress—at Christmas time—into so many lovely Queens of May.

1964. In reward for all this, see that any plant, from the gorgeous gay camellia to the humblest denizen of next year's flower-garden, is placed in *safe quarters* at *once.* I say *safe,* not WARM *quarters:* the latter would be most unsafe. Plants that have stood for months in the free air of heaven are most impatient of confinement. Unless the wind is very cutting, or the thermometer is under 40°, the houses should stand open night and day for several weeks after the plants are admitted; otherwise the sudden change of temperature would either cause flower-buds to drop, or excite to premature wood-growth,—the probability being that it would do both.

1965. All plants are liable to injury from this cause,—camellias perhaps more than any other. Sudden transitions from an open, free,—to a close, confined atmosphere,—rapid alternations of temperature, and either extremes of wet or dry at root or top, are the main, if not the only, causes of flower-buds dropping in this beautiful species. But the causes that influence this plant so powerfully and suddenly affect all others in a greater or less degree. Hence the importance of adopting, in all changes with plants, the *sliding*-scale system. The change from a low to a high, or a high to a low temperature,—from a dry to a moist, or a moist to a dry atmosphere, must be gradual and easy. In one word, the length of the *scale* must be adapted to the extent of the change contemplated; and the smaller the angle of inclination and the slower the plants progress from one elevation to another, the better the chance of perfect success.

1966. Those gardeners who treat their plants as "Punch" did the farmers in his famous free-trade caricatures, must expect to see them go pell-mell to ruin; but those who treat them as the farmers were treated in fact, will find every change effected in their condition contribute to their health, strength, and well-being. The cultivator cannot afford to forget these principles at any period of the year; but their application is of the first importance during the operation of housing plants for the winter. The plants should also be thoroughly cleaned, pots washed, and top-dressed if they require it as they are introduced into the houses. A great deal may also be done, by proper arrangement, to give an air of order and design,—which in themselves have much of the charm of beauty. Some people contend that there is more in the manner of speaking than in the matter uttered. However much of truth or falsehood—and I believe there are both in this, it is certain that there is often more beauty and satisfaction derived from the orderly arrangement of plants than from the plants themselves. The very same principles are applicable here that we have laid down for the embellishing of flower-gardens. The widely different circumstances will modify the practice, but the same leading objects must be kept in view; and where each different tribe of plants has its special house devoted to its use, the practice in the two cases is not so very widely divergent; but where almost every variety of plants have to be crammed into one house, cultural, rather than artistic considerations, must control the arrangement. A leading point in all cases is to have a system, and to make that obvious. This alone leaves the imprint of superintending care.

1967. The predominance of cultural considerations does not necessarily destroy artistic beauty. The grouping of different species together, so essential to the former, is almost as necessary to the latter. Wherever geraniums, heaths, azaleas, camellias, &c., are not only flowered, but grown in one house, the grouping style is not only the best in a cultural sense, but is the most effective. By placing geraniums and other plants in flower in the warmest end of such a house, and heaths at the very coldest, it is amazing what a difference of climate, succession of bloom, and inexhaustible pleasure, may be derived from a single house. But if the plants are crushed in higgledy-piggledy in one house, a suffocating sense of confusion and want of space will be the primary impression received and retained.

1968. But this will be the case whether the glass comprehend only one or twenty houses, if the rule-of-thumb want of principle system of filling—I won't call it furnishing—be adopted. On the other hand, even houses of bedding plants may be made interesting by grouping the different species. Edgings and lines of demarcation, and different shapes, groups, or masses, on stage, shelves, or floor, may be formed with variegated geraniums, alyssums, cinerarias, &c. Lines of gold- or silver-edged geraniums may not only be stored away, but form beautiful objects on conservatory or greenhouse shelves, to contrast with Chinese primroses, &c.

1969. *The Conservatory.*—I will dismiss this subject with the single remark that the conservatory is always dependent for three-fourths of its charms upon the taste and skill displayed in its arrangement. Beautiful objects beautifully placed, lovely climbers neatly festooned or gracefully trained, and the preservation of all this beauty as long as possible, are the grand desiderata here. As a cool atmosphere is one of the chief means to this end in summer, the mistake is sometimes made of maintaining this structure at too low a temperature. It should never, unless in the severest weather, be lower than 45°. Comparatively few blossoms will expand in perfection, or continue so long, at a lower temperature than this. From 45° as a night temperature to 55° as a day, is a safe range for the next four months with fire-heat, 50° being a safe day medium and 55° the maximum by artificial means. If the sun is genial enough to raise the temperature to 60° a few hours in winter, and air is admitted, it will do no harm. In managing the house, two things must be equally guarded against,—a moist stagnant atmosphere and a sharp current of frosty air. Although directly contrary in their nature, both are almost alike destructive to flowers; the one rapidly destroys, and the other speedily blasts, their beauty. The proper balancing of air at rest and air in motion, and the right proportion of moisture to be suspended in it constitutes the true secret of successful conservatory management. In general terms, it may be stated that the more light that can be secured for the next four or five months the better. Hence, all shading may now be dispensed with, and the foliage of the climbers gradually reduced, however beautiful they may be. They should be gone over two or three times until they are finally cut in to the smallest compass by the middle of November. Every ray of light at that period is alike necessary for the health of the plants and the colour of the flowers. Little or no syringing or sprinkling of paths will now be necessary, except a few sprinklings over chrysanthemum and camellia leaves for the first week or fortnight after their introduction from out of doors. Generally, at this season, a sufficiency of vapour will rise from the surface of pots and borders, without having recourse to either sprinkling leaves or paths. Care must be taken not to wet the latter in performing the necessary watering. Chrysanthemums will require a liberal supply of clear manure-water every day in bright weather, and must never be allowed to droop from the want of it. If they do, their best and finest leaves will be exacted as a penalty for our neglect. Chinese primroses will require the next largest supply of water; then early-flowering epacrises, camellias, heaths, &c.

1970. Plants in full growth coming into bloom always require more water than plants past their meridian and waning to decay. Therefore all I have already named, and early cinerarias, &c., will require much more copious supplies than late-flowering fuchsias, geraniums, begonias, &c. &c. Semi-stove plants, such as gesneras, gloxinias, globe amaranths, achimenes, &c., which, owing to their great beauty, it is desirable to keep in bloom throughout the month in this house, will now require very little water.

1971. In reference to all such, and stove-plants in general subject to conservatory treatment, it is of immense importance to bear in mind that the lower the temperature in which they are placed the less *water* they require, and *vice versâ*. Cold, which stimulates man's assimilating organs to the utmost, paralyzes those of plants in the exact ratio of its intensity. Hence the necessity of a stinted regimen in cold weather if vegetable life is to be preserved in full vigour. These remarks are applicable to all plant-structures, but are particularly applicable to a house where luxuriant health should ever appear adorned with a wreath of floral beauty. Heaths, epacrises, late pelargoniums, scarlet and other fuchsias, geraniums, arums, petunias, salvias, Chinese primroses, Japan lilies, and chrysanthemums, will now constitute the chief display here.

1972. *Greenhouse and Heathery* require similar general treatment, but should be kept five or ten degrees cooler than the conservatory. They will also bear sharper currents of air with impunity. Leschenaultias, chorizemas, &c., in this house, must be carefully examined for green-fly. This pest is very prevalent among, and very fatal to, the first-named plants. Sometimes it also suddenly attacks heaths, pimeleas, &c. As soon as one is discovered, fumigate instantly with tobacco-paper. This is also a good time to eradicate scale—white, black, or brown—from acacias, clianthus, and any other infected plants, and hand-picking the only effective remedy. I am sorry I cannot pronounce any nostrums effective for the eradication of these pests. They all remind me of grandmamma's receipt for catching the peacock by puting salt on its tail.

1973. To put the nostrum on every leaf and branch (not the tail merely), and wash it clean off with a brush, &c. ;—truly, I would just as soon wash it off with the brush, or pick it off with my fingers, and save the price of the infallible remedy. I think Gishurst's compound, Neal's soap, &c., may destroy thrip, as well,—perhaps a little better, than a strong decoction of clear soot-water in soap-suds. But as for scale and mealy bug, I fearlessly assert, all the testimonials to the contrary notwithstanding, I have never yet been able to kill it by dipping or washing in any nostrum whatever. I only wish I could, and regret being compelled, by a sense of justice to the reader, to make such a humiliating admission. Where plants have become infested very much with either of these pests, the most satisfactory way, unless they are very valuable, is to destroy them. But they ought never to be allowed to become very *bad.* If a stitch in time saves nine, a pick or wash in time saves nine hundred and ninety-nine. And it is in thus attacking insects in *time,* as soon as one is seen, that the true secret of cleanliness and health lies. Better examine a whole collection and not find one, than allow one to become a million through a month's oversight. If practicable, therefore, no plant should be taken into the house without being carefully examined and thoroughly cleaned. The necessary washings involved in this operation, while essential to cleanliness, have also a powerful indirect influence in preserving the plants in health. So great is this secondary benefit, that some cultivators have maintained that no collection of stove-plants can be preserved in luxuriant health without the existence of these aids to successful culture. While I would much rather dispense with their assistance, doubtless the ablution that their extermination involves, enables plants to perform their respiratory and elaboratory functions with more ease and greater energy.

1974. *Pelargoniums.*—Maintain a temperature of 45° by fire-heat, allowing a rise of 10° by the influence of the sun. No syringing or sprinkling must be permitted here, and care must be exercised in watering, to keep the leaves dry. Give air with great caution, avoiding biting winds and cold draughts. This is necessary with Fancy, which are more tender than either the French or show kinds, as they are termed. Great injury may be done even by keeping the door open a few minutes when the wind is blowing *into the house,* and the plants should never be moved out to the potting-shed for shifting after this period. Sudden changes are a fruitful source of that most provoking and troublesome of all diseases to which these plants are subject,—*spot.* I consider this disease incurable ; if it unfortunately appears, either separate the plant from all the others, or destroy it at once. Nothing has given rise to more dispute among geranium-growers than this : it is almost as knotty a point among cultivators, as is the nature of electricity among philosophers. This much is generally admitted, that it is consti tutional, hereditary, and infectious. I believe it may also be induced by any or all of the following causes :—imperfect drainage; the use of crude and not sufficiently decomposed manure or leaf-mould; the presence of oxide of iron in the soil; sudden draughts of cold air; using water for the plants much colder than the temperature in which they grow; allowing the sun to shine on the foliage, so as considerably to raise the temperature of the house previous to the admission of air in the morning; permitting the drops of cold condensed vapour to drop from the roof on the same leaf, or part of a leaf, for days, perhaps weeks together; over-watering; using too strong manure-water; not giving water enough, or dropping the same on the leaves; escape of gas from flues; careless fumigation and excess of moisture in the atmosphere of the house, especially if it is cold and close; and, in fine, any or everything that tends to check the free current of the sap through root or branches, may produce, and always intensifies, the destructive energy of this disease. By carefully avoiding all these causes, the probability is, that you will never be troubled by the spot, and it is certain that your care will be rewarded by healthy and beautiful plants. Green-fly is often troublesome, but it is easily got rid of by fumigation, and with good culture no other insect ever attacks pelargoniums.

1975. To secure profusion of bloom, early growth and under-potting are of the first importance. No matter how robustly a plant is grown, one eighteen months old cannot be made to flower so freely as one four or five years old. Whether the closeness of tissue, induced by age, modifies the nature of the sap during its passage or not, I cannot tell. It is probable that the smallness of the vessels may influence, not only the quantity, but the quality of the sap. It is at least certain that age in this and many other species is favourable to profuse inflorescence. Early growth is of the most importance. Plants to flower in May should be cut down by the end of the previous June; have broken, been reduced, repotted, and encouraged to grow two or three inches in a close cold frame, for a fortnight, and have received their final stopping by the end of July, and be placed in their blooming-pot by the 1st of November. Success depends upon their chief growth being completed before Christmas. No after-management can compensate for the neglect of early growth. Any size of plant or leaf may be obtained at any period; but the flower will be scarce unless early growth is secured. Under-potting is the next great point. Plants in general, and pelargoniums in particular, flower best when they are pot-bound; that is, when the roots are trying with all their strength to burst the pot asunder. The energy they thus acquire appears to rush to the other extremity, and expend itself in flowers. Some varieties will scarcely flower at all unless their roots are in this condition. The reason seems to be, that whatever tends to check the extension of other parts, favours the development of flowers. The vital energies arrested in the formation of wood, concentrate their force in the exhibition of bloom. It would appear as if the vital force in plants was not sufficiently powerful to carry on both these functions simultaneously. At all events, when one is most active, the other is almost passive, and the power of the one is nearly always in the inverse ratio of the other: hence, whatever favours the production of wood (free, large potting for instance), is unfavourable to the production of flower, and *vice versâ*.

1976. The following is a list of excellent show, French or spotted, and fancy varieties. Those marked thus * are the most expensive; but fine selections from this list can be had from 12*s.* to 60*s.* per dozen:—

Show Geraniums.

Ariel,—nearly white, with dark carmine spot on top petal.
Amy,—pink; deep spot on upper petals; excellent flower.
Aurelia,—purple; white centre; upper petals maroon.
* Bride (the),—pure white; rosy carmine blotch; fine rose.
Blink Bonny,—crimson, lower petals; black blotch, upper; fiery margin; free-blooming.
Bianca,—white lower petals; upper ditto carmine; margin white.
Belle of the Season,—lower petals white, tinged with pink; upper, cherry; white edges.
* Céleste,—rich orange lower petals, white centre; upper petals maroon, edged with orange-scarlet.
Candidate,—rose lower petals; white centre; maroon and orange top.
Carlos,—rose lower petals; white centre; maroon top, edged with carmine.
Conspicuum,—fine show variety.
Delicata,—rose lower petals; maroon blotch on upper.
Desdemona,—pure white; maroon top petals; fine show variety.
* Destination,—chocolate; deep maroon spot on lower petals; upper, maroon blotch, with an even margin of the ground colour.
* Eclipse,—deep scarlet; maroon blotch on top petals.
Emperor,—crimson lower petals; dark upper petals; showy and fine.
Etna,—scarlet lower petals; maroon top; margin scarlet.
*Euphemia,—bright rose lower petals; dark top; carmine margin; white centre.
Eastern Beauty,—orange-rose lower petals; upper, maroon; white centre.
Fairest of the Fair,—white; pink blotch on upper petals; free bloomer; first rate for exhibition.
Fair Helen,—white; dark blotch on upper petals; margin white.
* Fairy,—lower petals pink, with maroon spots; upper, deep maroon; free bloomer.
Fire-Queen,—fiery scarlet; dark blotch on top.
Glow-worm,—crimson scarlet; maroon blotch on upper petals.
* Garibaldi,—rose lower petals, white centre; top, dark maroon; strong habit.
Governor-General,—deep rose, tinted orange; maroon top; first-rate show variety.
General Havelock,—lower petals bright rose; white centre; upper petals dark crimson; fine show variety.
* Hyperion,—rich scarlet lower petals; maroon, upper; fiery margin.
* Hesperus,—bright salmon; dark blotch on upper petals.
Jacques,—orange-rose lower petals; dark top.
Jessica,—salmon lower petals; rich top; orange margin.
King,—scarlet; tall grower.
* Lady of the Lake,—delicate pink shaded lower petals; upper, maroon; fine form; good.
Lady Alice Peel,—soft pale lilac; maroon blotch; white centre.
Leviathan,—purple; large blotch on upper petals; very large; splendid show variety.
Lady Canning,—large rose; white centre; dark spot on upper petals.
* Mrs. Hoyle,—violet-rose lower petals; black spot; good.
Mrs. Benyon,—deep rose; white centre; upper petals rich maroon.
Mars,—deep crimson; very constant; fine and good.
Mr. Foster,—rich lake lower petals; upper dark crimson, shaded rose; pure white centre.
* Patroness,—large white; shaded crimson on upper petals; white margin; fine form.
Perdita,—crimson lower petals, white centre; black, upper ditto.
* Prince of Hesse,—deep rose and red lower petals; top ditto rich maroon; carmine edge; white centre.
* Princetta,—rose and dark red lower petals; upper, crimson; white centre.
Princess Beatrice,—white lower petals; maroon top; white margin; good.
* Prince of Wales,—rose lower petals; dark maroon top; white centre; fine.
Queen of Scarlets,—rosy scarlet; black spot.

*Queen of England,—splendid white, with rosy carmine spot.

Rosa Bonheur,—tinted carmine lower petals; white centre; top petals very dark, and striking.

Rosalind,—crimson lower petals; upper, black, with fiery margin.

*Review,—crimson lower petals, white edge; upper ditto glossy black.

Rose Celestial,—soft rose lower petals, white centre; maroon blotch on top petals, edged with rose; good.

*Ruby,—large rosy purple flower; first rate for exhibition purposes.

Sir Colin Campbell,—orange-red lower petals, white centre; upper petals dark maroon.

Sunset,—bright rosy scarlet; fine.

Scarlet Germ,—fine rosy scarlet, with deep spot on upper petals.

Snowdrop,—pure white, with small purple blotch.

*The Lady of Quality,—orange-rose, maroon spot on top petals; clear white centre.

*The Gem of Roses,—a peculiar shade of rose; large white throat; maroon spot on top petals.

*Transcendant,—bright crimson lower petals; black top petals; smooth, rich, fine flower.

Viola,—lilac lower petals, white centre, maroon top.

*Volunteer,—white centre, and edges tinted with carmine.

French or Spotted varieties.

Admiration,—rose, edged with white; dark spots on upper petals.

Adam Bede,—deep pink, under petals crimson, margined with the bottom colour.

*Arthur Henderson,—very dark maroon; black spots; light centre.

*Archimede Rose,—crimson; maroon spots.

*Bertie,—deep rose; rich spots on lower petals; upper ditto carmine; fine good show variety.

Bracelet,—large rose-maroon spots; dark blotch on upper petals; fine.

Beadsman,—pale pink; maroon spots on centre petal.

Black Diamond,—dark crimson, margined with rosy scarlet.

*Constellation,—quite new; beautiful.

*Chevalier,—crimson; dark maroon spots and blotches.

Count Cavour,—rose-white centre; dark spots on all the petals.

*Criterion,—pure white lower petals, with rosy-purple spots at the base; upper ditto black.

Duchesse de Malakoff,—white ground; light purple blotches.

Dr. Andrey,—light-crimson rose; dark blotch; beautifully fringed.

Duc de Magenta,—deep rose; dark maroon spot; white centre.

Eclipse,—brilliant scarlet; fine dark spots.

*Edmond Bossier,—carmine rose, lower petals; upper, black maroon; black spots; purple veins.

Endymion,—bright rose; all the petals spotted with black.

Eugène Duval,—fine purple.

Eole,—mulberry lower petals, with upper ditto with dark blotches.

Fairy Queen,—rose-maroon blotch; white centre; fine.

*Fair Rosamond,—white, with purple spots; good.

Guillaume Peveryns,—lilac-maroon spots.

Gustave Odier,—crimson lake; crimson blotch; good habit.

Géant des Batailles,—white, shaded with crimson-scarlet spots; fine large flower.

Hortense,—salmon-rose; crimson blotch.

Impératrice Eugénie,—pure white; dark violet spot.

James Odier,—bright carmine, tipped with rose; violet spot.

*Leo,—orange-rose spot on lower, and blotch on top petals.

Madame Furtado,—blush spot; rosy-crimson.

Madame Pescatore,—rose-crimson spot; dark blotch on upper petals.

*Mara,—rose, with white edges; dark spots, shaded with violet.

Osiris,—rich crimson; dark spots on upper petals.

Oscar Lisible,—carmine; light maroon blotch; white centre.

Pandora,—scarlet, with light margin.

Perrugino,—superb pink, with large spots.

*Phiton,—deep crimson; dark maroon spots; white centre.

Painted Lady,—pink; white edges; maroon spots.

*Rupee,—purple lower petals; black upper ditto; fine purple margin.

Riflemen,—crimson-scarlet; black spots; fine free-grower.

Rubens,—flower crimson; scarlet blotch; maroon spots.

Sanspareil,—bright rose; crimson spot; good form.

Salvator Rosa,—rose, shaded violet; brown spots; white centre.

Scaramouch,—fine exhibition variety.

*Senior Wrangler,—peach; maroon spots; shaded margin.

Spotted Pet,—lilac; maroon spots; large blotch on upper petals.

*Telegraph,—crimson lower petals; upper, bright maroon; deep habit; free bloomer.

*The Comet, — bright crimson lower petals, maroon spots; upper ditto, rich maroon; deep, fine bloomer.
Vicomtesse de Bellevue, — bright crimson, faint spots; white centre, shading to violet.

Fancy Geraniums.

Annie, — deep purple-maroon; white throat and margin.
Advancer, — mulberry, light margin; lower petals blush.
*Amy Sedgewick,—rose; fine form and quality; clear white centre and edges.
Adèle,—light rose, white belt on each petal; good form.
Bridesmaid,—lavender rose, edged with white; good form and substance.
Beauty of Slough,—rosy-crimson; white centre; fine.
Crimson King, — crimson, dwarf and showy; medium size.
Cassandra,—crimson and white.
Celestial,—bright light rose.
Claudiana,—crimson upper petals; light margin.
Cloth of Silver,—silvery white, with delicate rose blotch.
*Countess Waldegrave,—dense crimson; white throat; fine.
Decision, — mottled crimson; margined white.
Delight, — rosy crimson; upper petals bright cerise; delicate habit; light throat and edges.
Delicatum, — white, with delicate rose blotch.
Dictator,—mulberry, edged with white.
*Emperor of Morocco,—mulberry; lilac throat and edges.
Evening Star, — rich purple crimson; white edge; fine.
Formosum,—rich carmine; lower petals mottled white.
Fairy,—pretty lilac; white upper petals.
Fleur de Marie,—clear white, with purple blotch and spots.
King of Roses,—carmine rose; white centre.
*Mademoiselle Patti,—pink lower petals; violet rose upper ditto.
Moonlight,—light rose; white margin and centre.
Negro, — very dark; white throat and margin.
*Painter,—violet-crimson; light margin on upper petals.
Princess Royal,—silvery white lilac; rose blotch on upper petals.
Perfection,—violet rose, margin white.
Rosabella,—carmine; white margin; lower petals white.
Sarah Turner, — crimson, suffused with purple; lower petals white; fine.
Sweet William,—various shades of colour; peculiar edge.
Undine, — very large, rosy lake, with light throat and edges.
Venus,—light; lower petals suffused with pale pink; upper petals rose; fine.
Vivid,—very bright rosy-crimson; white throat; fine.

1977. *Stove.*—Vincas, Clerodendrons, &c., that have finished flowering, should now be cut back, and after they have slightly *broke,* be shaken out of the pots, and inserted in as small pots as possible, for they seldom winter well in large pots. Water liberally poinsettias, justicias, begonias, gesneras, &c., coming into bloom,—other plants going out of flower water scantily. All watering should now be done in the morning; and sprinkling, &c., unless on very bright days, entirely dispensed with. Drips of water must not be allowed to stand on variegated begonias, or other fine-foliaged plants, after this period: their impaired vitality, combined with the decrease of solar heat, renders them peculiarly liable to be injured from this cause; the structure of the leaves speedily becomes decomposed, and large blotches or holes appear, in consequence. Climbers on roofs, and all artificial shade, must be gradually and finally removed during the month. From this time to the middle of January the utmost amount of solar light attained in our climate is all too little for the natives of tropical climes that generally find a home in our plant-stoves. During cold nights a temperature of 60° will be sufficient, rising to 70° during the day, which must be the utmost maximum of fire-heat permitted for the next four months: five or ten higher degrees from solar influence will be very serviceable. However, air must in such cases be given at once, and caution used to prevent the artificial and solar heat exerting their full force simultaneously. Few plants are proof against the disastrous shrivelling influences of being thus placed between two fires: neither is it at all necessary to give air daily. Often for a week together, a sweet genial atmosphere may be maintained within, when the outside air is totally unfit for admission. Nothing requires greater practical knowledge and sounder judgment than the ventilation of tropical plant-structures in winter; a happy medium between the close glass-case and cutting-hurricane system is the grand desideratum, and nothing but enlightened experience, and an innate sympathy with the plants cultivated, can confer the necessary qualifications for the performance of this important operation. It should ever be borne in mind, that plants are endowed with the power of purifying their own atmosphere within certain limits; and that, consequently, the incessant admission of ungenial, harsh, external air, is not essential to their healthy existence. On the other hand, they rapidly exhaust the supply of carbonic acid gas present in a given quantity of air, and, therefore, an occasional change of air is essential to furnish them with food. Not only that,—the quantity of oxygen liberated bears a relative proportion to the amount of carbonic acid gas consumed; consequently, the less of the latter appropriated by plants, the less of the former is given back to the air, and it becomes the sooner deteriorated in consequence. It therefore follows, that while for a limited period plants may thrive in the same atmosphere, their constitution and necessary wants demand a change sooner or later. The frequency of the change required will very much depend upon the energy with which the vital force is being expended. In other words, the faster the plant grows, the more fresh air will be necessary. Now, as winter is the dormant period, less external air is requisite in winter than at any other period of the year. The fact thus elucidated is of immense practical importance to the cultivator; for just when it is well-nigh impossible to admit such air, we discover, both by science and experience, that its presence may be largely dispensed with. This remark is equally applicable to the cultivation of orchids; it even applies with double force to them; for, as most of these will now be comparatively dormant, this house may often remain for a month without fresh *air* with impunity. The great points are a dry atmosphere and a comparatively low temperature,—from 65° to 70°, and the maintenance of all in a dormant state. Now is the great cleaning season; every scale, bug, earwig, cricket, &c., must now be ferreted out and destroyed.

1978. *Forcing-Pit.*—Introduce the first batch of rhododendrons, kalmias, Ghent and Indian azaleas, &c.; also some tea and hybrid perpetual roses, and early-flowering and sweet-scented geraniums, white and Anne Boleyn pinks, perpetual carnations, and lily of the valley; also Salvia gesneraflora, late gesneras, and Euphorbia polygonifolia. Towards the end of the month, some hyacinths, tulips, &c., potted towards the end of September, should now be pushed forward in this structure. Procure, and pot forthwith, the whole stock of hyacinths, crocuses, narcissuses, tulips, jonquils, and other hardy bulbs.

1979. *Cold Pits and Frames.*—Give all the air possible, unless it actually freezes; guard against damp and over-crowding; carefully examine mignonette, stocks, &c., and remove every bit of mould the moment it appears. Provide mats or reed covers in readiness against frost; keep the glass clean, and let vigilant attention to the minutest details be the keynote of your successful culture of flowers under glass in "brown October."—D. T. F.

§ 6.—Culture of Fruit under Glass.

1980. In our climate, it must be cultivated under glass, if at all, at this season of the year; and those who wish for peaches or grapes on their table in May must begin this month. The first part of the old proverb of "Early to bed, early to rise," &c., gives an excellent cue to the theory of the successful culture of early fruit. The advantages derived from the practice commended in this old saw are not greater than the great truth taught that, as a rule, the earlier we go to bed the earlier we will rise.

1981. Early work calls for early rest; and where this call is refused, the work will either be badly performed, or the machine will speedily be worn out. Hence, if plants are required to move to any good purpose *early* in the autumn, they must rest early in the summer. Only thus can they be endued with sufficient momentum to overcome the dull, heavy *inertiæ* of the dead season; forcing plants now, is like a steam-engine dragging a heavy train up a steep incline: it will do it all the easier if it has just run down a rapid fall on the other side. Analogous to the power of resistance thus acquired is the sleep of vegetable life previous to the awakening of its energies. It will scarcely move at all at this season unless its resources have been husbanded, and its vital energies intensified by some such means as this. The decrease of the sun's enlightening, mellowing, and revivifying power; the shortness of the day; the intensity of the cold; all exert a powerful—well-nigh all-powerful—somniferous influence on vegetable life. How poor a substitute is artificial heat and moisture (the only life-exciting agents in our power) for that intense light and omnipotent energy which arouses with irresistible might all plants from their sleep in the natural spring. However, if plants have had a good long rest, and if they have first of all finished their summer work well by thoroughly ripening their wood before they went to bed, it is astonishing what an influence a warm bath has in arousing them to vigorous exertion. Only it must not be too warm;—water, at a temperature of 50°, applied at first with a syringe all over, in the form of a shower-bath, will suffice. A temperature of 45° or 50° being maintained at the same time, and the bath being repeated twice a day, the plants will begin to rub their eyes—push the bark off the buds, and open them and look about,—that is, the buds expand out of their case. No sooner do they become thoroughly awakened, than they must be provided with work; and one of the greatest mistakes in forcing is to allow them to go to sleep after they have begun to break. Sudden depressions of temperature always have this tendency: they check growth, or, in other words, send them to sleep again; and this sleep in working hours is always fraught with danger, often produces death,—to say nothing of the injurious effects of the stimulants necessary to induce new growth,—the mere fact of its forcible cessation, from cold or excess of heat, is pregnant with disease and disaster to plant-life.

1982. From the time the bud bursts its horny sheath until the luscious fruit melts in your mouth, all work and no play,—all growth and no check,—must be the stern regimen of the successful cultivator. If this is important at all seasons, it is essential now. It is only by constant and vigorous action that the *inertiæ* of the dead season can be conquered. Velocity of motion is the best antidote to the resistance of friction; so is a rapid and vigorous flow of the sap essential to healthy growth. At this season, unless the sap is urged on with power, the chances are it will not flow at all; but an excess of speed must also be avoided; for what is gained in speed is often lost in safety. The *inertiæ* of friction may be overcome at the expense of destroying the centre of gravity; so may an elongation of parts be obtained at the expense of solidity and strength. Motion in itself is of little use, and may be applied to the worst of purposes. Guided by intelligence and skill, it subserves the highest interests of man; so the motion of the sap through vegetable vessels, either fast or slow, is in itself of but little consequence. Unless, however, thwarted by man's stupidity or ignorance, that fluid is destined to form verdant leaves, lovely flowers, or luscious fruits. When man undertakes to control the time, circumstances, and results of its motion, great wisdom and skill must guide his movements, or he is doomed to failure. The first preliminary to success is a clear perception of the object in view,—that object is fruit. A too rapid extension of parts is unfavourable to fruitfulness; therefore this must be avoided. The embryo fruits are enwrapped in the buds, and the more vigorously they can be made to unwind themselves, the more robust and vigorous will the young fruit be. Heat in moderation, and a genial atmosphere, favour this vigour; heat in excess, or an enervating atmosphere, destroys it. Hence the importance of striking a balance between opposing forces, and securing a happy medium favourable to our purpose. That purpose is the greatest quantity of the best fruit in the shortest period of time, from the smallest possible space. A thorough comprehension of what is here stated, with the practical instruction already imparted, and yet to be given, will enable any and all of your readers to approximate at least towards these desiderata.

1983. *Peach-house.*—Supposing that the fruit was gathered in May or June, the lights removed in July, the trees pruned in August or September, they may now be thoroughly painted over with a composition consisting of equal parts sulphur, clay, cow-dung, and soot. The borders should also be forked up, six inches or one foot of the old soil removed, if that is practicable, for roots, and the same quantity of turfy maiden loam substituted in its place. Every bit of trellis and wood-work should also be thoroughly washed with soap and water, unless the house has just been painted, the walls whitewashed, coloured, or painted, and the hot-water pipes painted over with a mixture of equal parts lime and sulphur. Perhaps it will be as well to omit the painting from the first 12 feet from the boiler on the flow-pipe. If the roots are at all dry, water with manure-water at a temperature of 60°, which will not only moisten, but gently excite the roots, by considerably raising the temperature of the soil. Having thus laid the foundation of success in cleanliness and suitable food, place the lights on, and, if the weather is mild, leave them half-down night and day for the first week. If the roof is a fixture, give all the air possible at front and back, and leave the door open. Sprinkle the trees overhead several times a day ; sprinkle paths, &c., and maintain an atmosphere like a cool April morning. Proceed thus during the entire month, varying, of course, your treatment, the quantity of air, &c., by the nature of the external atmosphere. A temperature of 50°, however, should never be exceeded by fire-heat, if fire becomes necessary, which is not often the case, during this month.

1984. *Vinery.*—All preliminary matters may proceed here exactly on the same principle as for the peach-house. In all forcing, either of flowers or fruit, let cleanliness, both present and prospective, be your first care. Hence, before the painting, &c., let every bit of loose bark that will rub off with your hand be removed. I don't approve of severe barking,—scraping it off with knives, &c. ; as, although vines have endogenous stems,—that is, increase from the inside, and not from the out, and their bark is consequently not essential to their healthy existence,—still it is useful in retaining moisture on their stems ; and I am quite sure that nature never intended that they should present the appearance of so many *peeled sticks.* Both tidiness of appearance and the destruction of insects require the removal of that which is loose and easily removed ; to go beyond this, if not certainly injurious, is obviously unnecessary, and a tedious loss of time. The varieties best for early forcing are the Dutch White-water, Royal Muscadine, Joslin's St. Albans, and Black Hambro. Give them the same general treatment as that recommended for peaches during the month.

1985. Prune other vineries as soon as the fruit is cut, if the leaves are thoroughly matured, the wood almost as hard as bone, and they are required to start afresh in January. If neither of these conditions, nor all of them, are present, defer the pruning for another month. Carefully look over grapes twice a week, removing every dead berry or leaf that may have fallen on a bunch.

1986. If late grapes, such as Muscats and West St. Peter's, are not ripe, they must be ripened off with a brisk fire as speedily as possible. If not ripened forthwith, they will not only be deficient in flavour, but will not keep well. When a bunch of grapes has to be cut at once, either to make room or prune the vines, nine inches or a foot of the branch should be cut with them, and the bunches be suspended in a cool dry room : they will often keep better in such positions than on the vine. In all cases where orange-trees or other plants are compelled to be placed in houses containing ripe grapes, I would advise that the latter be cut and thus stored away. I have kept grapes so for three months; Muscats keeping best, Hambro and West St. Peter's next; and Frontignacs worst of all. Grapes cut for this purpose must never be *laid down;* cut them carefully, leaving all the leaves on the branch. Hand a couple of bunches, one at a time, to an assistant, and proceed to hang them up. The slightest bruise by laying them on their side, or allowing two bunches to be carried in one hand, would prevent their keeping. The riper they are, the more care is necessary in this respect. If slightly shrivelled, they keep all the better. In fact, I believe shrivelled Muscats would hang in this way for six months without injury. This mode of clearing a house at once is often of the greatest consequence to the cultivator, and may be adopted with the utmost confidence.

1987. *Pineries.*—It is a good plan to cover the pots of succession and other pines (say two inches thick) with partially decayed tan or leaves for the winter. This obviates the necessity of watering through the winter months, and maintains the roots in that medium state of dryness so favourable to the health of the plants during that period. Those planted out in beds might be mulched over in a similar way. The less water that can be given to pines in any stage during winter, consistent with their health, the better: their peculiar structure renders them especially liable to injury from the accumulation of moisture in the axils of the leaves. Whenever it is necessary to water for the next four months, the water must be applied to the *soil only.* It is often necessary to use a bent tube, with a funnel at one end, to prevent it falling upon the leaves. If the atmosphere of the house, from the continuance of bright sunshine, or any other cause, becomes too dry, it will be better to secure the necessary humidity by evaporation from the surface of the floor and heating apparatus, rather than by syringing overhead. After this period maintain a temperature of from 60° to 70° to all pines,—the maximum being applied to the fruiting plants. The bottom-heat may range from five to ten degrees in excess of the atmospheric temperature. Give a little air when the external air is sufficiently genial; guard against sudden changes, and maintain a growing atmosphere to fruit swelling off. Cut pines in winter a week before they are ripe, and place them in a hot dry place (near the kitchen fire will do), in a temperature of from 80° to 90°. This will prevent all risk of the fruit decaying, and vastly improves the flavour.

1988. *Melons.*—A second or third crop may occasionally be well ripened during this month. If in pits, renew linings, &c., to maintain a brisk heat; if in houses, keep the fires moving to secure a bottom-heat of 80°, and a surface one of 70°. Beware of watering to excess, as less can be thrown off by the leaves now than earlier in the season; consequently, more must be absorbed by the fruit, which is apt to burst, and often becomes insipid in consequence. With care upon this point, melons may often be ripened as successfully in October as in August.

1989. *Figs.*—These may possibly be ripening their third crop; if so, a brisk temperature of 65° or 70° must be kept up. If the second crop is gathered, and a third is not wanted, reduce the supply of water and the temperature to a minimum, to induce rest or hasten maturity.

1990. *Orchard-house,* unless used to ripen fruit that has been retarded behind a north wall, must now stand open night and day, or the trees be removed outside, and the house be devoted for three months to storing bedding plants, &c. If the trees are planted out in the borders, then the lights may be stored away for three months, or used for other structures. In all cases secure a season of perfect repose for the trees.

1991. *Strawberries.*—These will, or ought to have completed their growth for the season: the sooner they go to rest the better. The floors of orchard-houses are the best possible wintering-places;—as cool as possible, without being frozen, is all the winter treatment they require. Properly placed, it is seldom indeed that they require any water until they are wanted to grow. Lacking the floor or stage of any cool house or cold pit, the next best mode of keeping them is to stack them, not exactly as reaped corn is stacked, with all the heads inwards, but just the reverse—heads out, if you please. The stack can be built on any dry bottom; the best possible position being, however, the south side of a wall or fence. In such a position mark out a place a yard wide or so, and of any convenient length, according to the quantity of plants, and spread upon it a layer of ashes three inches thick; place a row of pots on their sides at the distance indicated from the fence, or nearer, in proportion to the number of plants or height of stack contemplated. Fill up all between the pots, and the space between the bottoms of the pots, with dry ashes or old tan, keeping the side next the wall a little the highest. Then place another layer of plants on the top of the first, about two inches further back than the other. Fill up as before, and repeat the filling up, and layers of pots, until this space is occupied, top of the wall or fence reached, or all the plants provided for. The whole will then present a sloping surface to the sun. A boarded roof, six inches wider than the bottom rows, should then project over the top, and slightly incline to the back: the front may be supported on stakes driven in at intervals of six feet. Always excepting the floor of a cool house, there is no better mode of protecting and treating plants than this. They are kept dry, the frost has little or no influence upon them; for if it is very severe, a thatched hurdle may be laid against them, and both pots and plants are preserved in safety. D. T. F.

§ 7.—BEE-KEEPING.

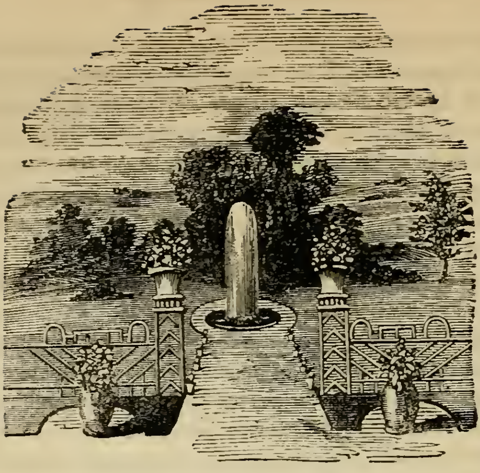
1992. The hopes and fears of the bee-master may be said to be over for the season. Almost all labour will be at an end in October: the weak hives are supposed to have been joined, the winter stock remaining; these must be weighed. If, after having allowed for the weight of the floor-board, hive, and comb (and comb, it must be remembered, increases in weight at the rate of one pound in each year), the hives weigh about twenty pounds each, there is nothing further to do but to keep them dry, warm, and clean through the winter. If they do not weigh so much, they must be fed until they do. White sugar, boiled in water for about five minutes after it has begun to boil, in the proportion of one pound of sugar to half a pint of water, makes excellent food, and as bees never waste anything, they need not be stinted; all that is given them is carried down and stowed away in the combs. All food should be given at the top of the hive, in fine mild weather, and in as large quantities as possible. Bees will carry down four or five pounds a day with ease, and as during the feeding the internal heat, and with it the consumption of the hives, is greatly increased, it is desirable to get the feeding over as quickly as possible: it should by no means be delayed beyond the end of October, and, once over, no more food should be given till March.

1993. The feeders, or if the bee-master has not as many feeders as hives, the condensers, should be left in till the beginning of March to catch and condense the perspiration that will rise from the bees, and which would otherwise run down the combs and make the floor-boards and hive damp and mouldy—the worst thing that can happen to the bees, and the cause of their frequent destruction.

1994. In the beginning of November, the floor-boards should be changed, and the entrances narrowed so that they will only admit one or two bees at once. Pieces of wood about three inches square and one inch thick should now be placed about an inch before the entrances, to keep off the sunshine and all reflected light, which would otherwise bring out the bees, when the cold air would cause the death of many of them. These pieces will not prevent the admission of fresh air, which is almost as necessary for bees as for men. The pedestals must also be examined just below the surface of the earth. If any signs of decay appear in them, they must be replaced by fresh ones.

1995. In February, advantage should be taken of fine dry days to do what painting is necessary; unless everything is quite dry when painted, the paint will peel off; therefore the middle of the day, after the sun has been upon the hives for some time, should be chosen for this purpose.

1996. Not much is now left to be done till March, except looking well to the coverings of the hives, keeping off all wet, brushing away the snow from the tops, entrances, and fronts of the hives, as soon as possible after a fall. Some recommend that bees should be altogether shut in when snow is on the ground; but the eagerness of the bees to void themselves in the open air, as soon as a thaw succeeds a long period of severe weather, is so great that it seems cruelty to do so: doubtless many will fall on the rapidly disappearing snow and perish; but one does not like to thwart their natural instincts from a purely selfish consideration. If many fall, a careful bee-keeper will collect them in a bell-glass, and having restored them to life by aid of a fire, will restore them to their hive: but unless the temperature be very mild, the bees will not venture out.



CHAPTER XXXIV.

STANDARD, CLIMBING, AND POTTED ROSES.

1997. STANDARD roses are used to decorate the lawn. Sometimes they are placed irregularly; at others they are planted at regulated distances round the walks; at others, again, they occupy the centre of the flower-beds; and in some instances they form separate beds in the rosarium; the different sizes being either planted in separate beds, or in rows rising towards the centre: the tallest standards forming the central row, while dwarf bushes pegged down occupy the edges of the bed. In all cases the effect they produce will depend upon the skill with which they are arranged, as to colour, continuous blooming, and general cultivation.

1998. Drooping and pillar roses are found among the Ayrshire, Boursault, Evergreen, Banksian, and Hybrids between these and the Chinese roses, all of which are distinguished by their long slender joints and flexible shoots. Potted roses,—that is, roses which flower in perfection under pot-cultivation —are found in every variety of the queen of flowers.

1999. They may be divided into—

I. Dwarf standards, having a stem varying from six to twelve inches.
II. Half-standard,—a foot and a half to two feet and a half high.
III. Standards,—three feet high.
IV. Tree and weeping roses,—four to five feet.
V. Pillar roses,—eight feet and upwards.

§ 1.—STANDARD, PILLAR, AND WEEPING ROSES.

2000. *Standard roses* are grafted or budded, generally on the stock of the dog-roses, budding being the neatest process, as well as the most certain, inasmuch as, in grafting, unless it is very carefully done, the head is not always secure. In budding, although two buds are inserted, one well placed is better, and it is not unusual to cut off the upper one if the lower one produces a vigorous shoot. Much of the success, however, depends on the choice of the stock. Where it is intended to form a collection by preparing stocks and budding, November is the best month for laying them in: they should be selected of sufficient thickness to support a good head, and of vigorous growth, removed to the place they are to occupy, with their roots uninjured, and as much of the soil attached as possible, and planted in soil rich enough to promote a vigorous growth before budding. "About six years ago," says Mr. Rivers, "I received, among others, some short dog-rose stocks, not more than two feet in height, but stouter than a broom-handle, the bark thin and grey with age: they were planted, and grew most luxuriantly. All stout and old rose-stocks require to be worked with very strong-growing sorts of roses to take off the abundance of sap and keep them in a healthy state. I had them budded with some varieties of the evergreen rose: they grew most luxuriantly, and not being adapted for sale, they were planted in a sloping bank of strong white clay, and left to bloom as nature dictated; not a shoot was ever touched with the knife. One of these, the *Félicité perpétuelle,* has been for three summers past a picture of beauty. When in full bloom the ends of its shoots rest on the ground, and it then forms a perfect dome of roses."

2001. Where the collection is to be procured from the nursery, the proper way would be to go over the nursery-grounds while the roses are in bloom, and select plants of the kind desired, bearing in mind that the foliage, as well as the flowers, should be healthy, for no after-care will compensate for a sickly growth and dwindling habit.

2002. Having secured and labelled the plants selected, which are to be sent home in the planting season,—that is, in November or February, according to circumstances,—the former season being recommended for dry sandy, the latter for moist retentive soils,—the stations or beds are to be prepared for them; bearing in mind that roses require plenty of light and air, and protection of some kind from the north and north-east, and that the dog-rose grows in almost any soil, but most luxuriantly in soils of a cool and rather tenacious character. If the ground in which they are to be planted is poor, it will, in most cases, be necessary to furnish the plant with an artificial station, digging out the ground for about three feet deep, and from two to three feet diameter. Into this station, having previously secured an outfall for water, place 18 inches of brick-rubbish, broken pots, &c., and fill up with a compost composed of pulverized clay one part, stiff maiden loam one part, and one part thoroughly decomposed cow-dung, mixed with a little pigeon's or poultry dung.

2003. In removing them from the nursery, some care should be taken to see that they are transplanted without lacerating the roots; above all, that they are not suffered to bleach in the sun, while others are being removed. Let them be taken up with as much soil at the roots as will cling to them. When they reach their destination, let them be laid in a trench by the heels until they are required for planting; and when all is ready, the roots trimmed and all decayed ones cut off, lay them out horizontally with the hand, so that they radiate all round the stem; and while the tree is firmly held in its proper place, sprinkle the compost over them gradually, pressing it gently into the roots; the hole being filled up, so as to form a slight mound round the stem, and a coating of mulch placed over all, taking care that the crown of the stock is level with the surface of the mound, neither planted too deep nor too shallow. Drive a stake of sufficient strength into the ground, and tie the stock firmly to it, in such a way, however, as to avoid galling the stem. Where the rose-tree is planted on a lawn, the turf is neatly replaced, and the mulching rendered inoffensive to the sight by a covering of moss, held in its place by a neat layer of pebbles arranged round the stem: whether in beds or otherwise, standards should never be nearer than three feet to each other.

2004. In order to obtain large standard rose-trees, "a judicious system of pruning, which tends to increase the size, is necessary," says Mr. Paul. "Having pruned some large specimens, I watched for the bursting of the buds, with the view of practising disbudding. When they had shot forth about half an inch, I took a knife with a sharp point, and commenced my search at the heart of the tree. From here I rubbed off a great number of buds close to the bark, leaving such only as, from their position, promised to increase the size or improve the colours of the head. If a bud were pushing where there was a gap, or which had a lateral or outward growth, it was left; the others thinned out. Proceeding upwards, I cleared the centre of the tree pretty freely towards the top and circumference; and the buds, where crowded or likely to cross each other, were removed. A month later they were looked over again,—and this was done again and again, watering them once a week during the growing season with liquid manure, the soil in which they grew having become impoverished. The growth was, in consequence, more vigorous than in the previous year, and the flowers fine. On the fall of the leaf in autumn, the trees were pruned as usual; little thinning was required. The second and third year the same plan was followed, and the trees are now of handsome form, large, and healthy, producing an abundance of good flowers." By pursuing this practice, and not by age and soil alone, some of the large trees which surprise the visitors to their nursery have been produced; "for the oldest tree," he tells us, "cannot number more than twelve years, while there are others much older and not half the size."

2005. The first aim of the cultivator is, of course, to establish the tree. Immediately after planting, Mr. Paul directs the head to be pruned more or less severely, according to the kind of rose; but closer now than at any subsequent pruning. In long pruning, which is applied to the more vigorous-growing roses, supposing it budded on his plan, and to have seven shoots, four of these are to be cut away, selecting those for cutting out, which grow from the centre. In spring the three shoots left are shortened in to a half or a third of their length, leaving the lowest on the tree longest, where practicable. In the autumn the shoots will have increased greatly; "pruning," Mr. Paul adds, "is now more complicated. The operator should examine the tree thoroughly before he commences. He should look, not only at it, but through it; and this, from two or three points of view: he should picture to himself certain shoots removed, and the comparative advantages to the tree before they are removed." The shoots are now left of greater length than in the previous year's pruning; "firstly," he says, "because the plant being established, will have a greater command of food from the soil; secondly, having been put in the right course of formation last year, in this pruning we have an eye to the production of flowers." In this pruning the aim is to keep the head compact and with well-ripened wood; this system of thinning-out and shortening the shoots is followed in subsequent seasons, until the tree is full-grown and full of vigorous flower-bearing shoots. A closer system of pruning is requisite for damask, tea-scented, French, and Bourbon roses, which make neat, compact, but rather formal heads. The head the first year is left more crowded, but the shoots shorter, and they are reduced by thinning-out to three shoots, which, in the autumn, have become much more numerous. In the case of autumnal roses, most of these will bloom the first autumn, after which all shoots not wanted are thinned out, and the others cut close in in the spring. There is great danger, however, in acting on general directions, as almost every kind of rose requires a modified treatment. The Provence rose requires a free use of the knife, shortening every shoot to three or four buds. The moss-roses require similar treatment: *Rosa gallica* should have all spray-like shoots cut out in May, if for summer, or in October if for autumn bloom, and all strong shoots shortened to six or eight buds. Hybrid Chinese, as large standards, require peculiar management: if shortened in too much, they give strong growth, but no flowers; they should, therefore, be thinned out to prevent crowding, and the other shoots shortened to twelve buds or so. Hybrid Bourbons bear closer pruning, in the first week of November if early flowers are required, to five or six buds, removing all wood that has borne flowers; for late flowering, do the same in April.

2006. Hybrid perpetuals form admirable standards, but they require a richly-manured soil, and watering with manure-water in dry weather, cutting off about two-thirds of the more vigorous shoots of the year's wood in November, if for early bloom;—in March, if for late, cut off three-fourths of the less vigorous ones, and thin out so as to prevent crowding in the summer. Bourbons require little pruning; thin out in March or April, and shorten all long shoots to four or five buds, pinching off the ends of long vigorous shoots in summer, so as to make them break.

2007. Tea-scented roses are scarcely fit for standards in our climate, unless protection can be given them. Mr. Rivers recommends their being budded on stems two feet high, so that they may be protected by attaching to each plant, stakes placed triangularly, and stretching over them a piece of tiffany tacked to the stakes, and brought within two inches of the ground, which will keep them in perfect health during winter. At the end of April prune off all superfluous wood and dead shoots, and they will bloom in great perfection.

2008. *Weeping Roses* are roses of vigorous, pendulous growth, worked on stems four feet and upwards in height. In the first pruning they are cut close in, and to have one bud only is an advantage; the shoots are thinned out as with standards, shortening back the others to give vigorous growth. The habit of the rose being pendulous and the shoots long, they soon sweep the ground, and present a pyramid of flowers.

2009. The nature of the stocks, whether the dog-rose or the Manetti be selected, limits the height to which weeping roses may be grown; but there seems to be no reason why either of them should not attain the height of ten or twelve feet, with a proportionate thickness. But in this case the chief support must be provided by a strong stake of wood or iron to which the stock may be fastened, while the head is extended outwards and directed downwards. For this purpose light iron rods and wire-hoops, of sufficient circumference, will be found very useful. If grown simply as an object of decoration on the lawn, a standard seven feet high, with a head five feet in diameter, formed of some of the climbing roses, as the Evergreen rose, decorated with some of the perpetual hybrids, as La Reine, Colonel de Rougemont, or General Simpson, drooping to the ground in a curving line, or on a larger scale forming an arbour, will form a beautiful tree when in bloom.

2010. Mr. Rivers gives a very instructive piece of gossip in his "Rose-Amateur's Guide." A friend of his, near Guildford, had his ground traversed by a railway, which was crossed by an unsightly brick bridge, and he was consulted how the bridge might be concealed. Ivy was too heavy, and he suggested evergreen roses. "They were planted with difficulty, the gravel being loosened with a pick, and some manure mixed with it. The roses grew with great rapidity, and soon covered every brick; but when they bloomed in large beautiful masses, some disappointment was expressed at the monotony of colour. I was prepared for this, and told my friend that they must be decorated. An incredulous smile met me with, 'How?' ThOn [illegible] aluly, the budding season. I proceeded with the gardener to the rcing was reand we took thence buds of the most beautiful hybrid perpetuals, n(the trees ag some of the bright rose-coloured tints, such as La Reine, Colonendarce of mont, General Simpson, our great horse being General Jacqueminot. My budding hand had not forgot its cunning; so I and the gardener proceeded to place buds in every shoot favourable to our purpose. Nearly all the buds 'took,' to use the gardener's phrase; that is to say, lived, and many of them put forth fine clusters of bloom the following August and September. I paid my annual visit to my friend in June the next year. As I approached the bridge, what a glorious sight met my eye. Amid the masses of flowers of the pale climbing roses, shone forth large clusters of the Géant, Jacqueminot, Triomphe des Beaux Arts, Prince Noir, Comte Bobinsky, Louise Peyronny, Rougemont, Jules Margettin, and others. The bridge was a fairy avenue, so charming was the effect."

2011. *Pillar Roses.*—There is no form in which the rose grows so gracefully as when they ramble over rocks, and climb up trees or trellis-work, or over the alcove. In the garden, well-planted pillars may become objects of great beauty. To make them grow with the necessary luxuriance, "each plant," says Mr. Rivers, "should have a station at least two feet in diameter to itself. In the centre of this space a stout stake of yellow pine, tarred at the bottom, should be driven two feet into the soil, and stand eight feet above the surface; the upper part painted green. If the soil be poor, it should be dug out three feet in depth, and filled up with rotten manure and loam, laying this compost about a foot above the surrounding surface to allow for settling. In wet soils they will grow the better for being on a permanent mound; but such soils should be well drained. In the centre of this mound plant a single rose, or, if a variegated pillar is desired, place three plants in the same hole,—a white, a pale-coloured, and dark variety. Having replaced the soil, cover the surface with manure, keeping the manure replenished, as it is drawn in by worms or washed in by rain. Water with liquid manure in dry weather, and there will be shoots, probably eight or ten feet in length, the first season. Three of the most vigorous should be fastened to the stake, and the spurs from them will, for many years, give abundance of flowers. "I scarcely know," says Mr. Rivers, "whether to recommend grafted roses on short stems for pillars, or plants on their own roots. This will depend in a great measure upon the soil, and perhaps it will be as well to try both. Most roses acquire additional vigour by being worked on the dog-rose; but some of the robust kinds grow with equal luxuriance when on their own roots: finally, for dry and sandy soils, I am inclined to recommend the latter, unless plants can be procured budded on the Manetti stocks, which, of all others, is the best adapted for dry soils." Of these roses, Brennus is a superb pillar-rose, its long flexible shoots adapting it for training up a column, or as a drooping standard rose. Roses of this character, throwing out long vigorous shoots of eight or ten feet in a season, require little shortening in the winter pruning: when cut in, it produces abundance of wood the following season, and few flowers. If only tied up to a wire, or trained on a pillar, it will be full of bloom. Blairii is ot similar habit; Chênedole and General Jacqueminot, and Triomphe de Bayeux, the only white Chinese hybrid, are all vigorous growers, and well adapted for a large standard or pillar-rose, the only drawback being their fleeting bloom.

2012. "The strong-growing hybrid climber, Blairii No. 2, is of similar habit,—ought to be pruned towards the end of July, and at no other time," says Mr. Beaton, "that is, just as they go out of bloom. The sort of pruning to be given, is to cut out all the strongest shoots close to the stem till the plant is thin enough and properly balanced, leaving the remaining shoots at their full length."

2013. When one of these roses has, through bad management, become bare of foliage, and, consequently of bloom, in its lower parts, it is restored to a healthy state by pruning back all the weak shoots at the bottom to one or two eyes, in October, before the leaves have turned. In February prune back all the secondary shoots, some to four, some to six inches. About the middle of April, cut off every leaf in the head down to where the eyes seem dormant. In July stop the strongest shoots, disbud, and thin, and tack them in till October, when the shorter shoots are again pruned back to one or two eyes, the middle-sized ones in February, and the strong ones in April, separating the same in the following October and February. In April of the third year leave the long shoots untouched. If these instructions have been carefully attended to, a splendid bloom will reward the operator's patience. The pillar is now in a properly balanced state, and its future management may be confined to pruning in July, when its bloom is over; confining the pruning to cutting out entirely all superfluous shoots close to the stem, and shortening in October all very weak shoots to two or three eyes.

2014. Hybrid China roses, suited for pillars, owe their origin to the China, tea-scented, Noisette, and Bourbons, fertilized with *R. gallica*, the Provence, and other roses. Others suited for pillars and climbing, generally, are the—

I. AYRSHIRE ROSE, and its numerous hybrids.
II. The MANY-FLOWERED ROSE of Japan (*R. multiflora*), many varieties of which abound.
III. The EVERGREEN ROSE (*R. sempervirens*), the wild rose of Italy, which hybridizes readily with the Noisette. One of these,—Rampant, Mr. Rivers tells us, "will cover a wall with as much rapidity as the Ayrshire."
IV. The BOURSAULT ROSE (*R. alpina*).
V. The BANKSIAN ROSE (*R. Banksiæ*).

2015. The Ayrshire roses, Mr. Rivers thinks, are perhaps surpassed in beauty by some varieties of the evergreen, but they have each distinct and desirable qualities; the Ayrshire blooms nearly a fortnight earlier than these; will grow where no other rose can exist, and they are admirably adapted to climb the stems of timber-trees or plantations near to frequented walks, and to form undergrowth; they also make graceful and beautiful standards, the descending branches shading the stem. "I have," he adds, "two standards of Bennet's seedling, about ten years old; their stems are ten inches in circumference; their branches trail on the ground, and when in full bloom nothing can be more beautiful. They have never been touched with the pruning-knife."

2016. *Rosa multiflora*, of which there are many varieties, chiefly of Italian origin, is a delicate rose, and is often killed to the ground by the frost. Covered with mats, it shoots so early that it cannot endure the spring frosts. Grevillea, or Seven Sisters Rose, is a vigorous climber of this family, blooming in clusters, of shades varying from rose to purplish crimson; for the flowers change from crimson at first coming out, to pale rose and purplish crimson. The protection recommended by Mr. Rivers, is to thatch over the pillar in November with green furze, which admits air and keeps off the severity of the frost; continuing this covering till March, and then removing it by degrees, so as to inure the plant to the cold before full exposure to it. In this way, Alba, or Double White, a pretty pale flesh-coloured rose; the Double Red, and Hybrida, or Laure Devoust, a most elegant and beautiful hybrid, with large flowers and beautiful foliage, combined with the neatness of the double red and white, will bloom in perfection.

2017. The Evergreen Rose (the climbing wild rose of Italy) is indebted to M. Jacques, the gardener at Château Neuilly, for its successful introduction; the fragrant *Banksiflora* is the result of hybridization with the old Musk Rose. Donna Maria is of the finest white, with full, dark glossy foliage and very double flowers. *Félicité* has several names; its characteristics are large double ranunculus-like cream-coloured flowers. *Brunonii*, although no true *Sempervirens*, has more colour than the usual roses of this species. *Jaunâtre* is a variety with yellowish-white flowers, evidently a hybrid with a musk or Noisette rose. Melanie de Montjose has large flowers of purest white, and beautiful shining foliage of dark green. Myrianthes is a charming rose, of perfect shape and most delicate colour. Princesse Louise is a vigorous grower, of a pale rose-colour, very double, and prettily cupped. Princesse Marie bears flowers of a bright rosy pink, beautifully cupped, and blooming in large clusters. Triomphe de Bolwyller, var. *Sempervirens odorata*, is a hybrid with the tea-scented rose; its flower globular, large, and very fragrant, blooming in autumn, but requiring a wall with a southern aspect.

2018. This family flourishes in all soils and situations, retaining their leaves till spring in shaded places. They form elegant and graceful standards, their pendulous shoots soon hiding the stem, and forming in a few years a pretty dome of foliage and flowers. Planted as pillar-roses, as already directed, they require no other pruning than cutting out all dead wood and spray; shortening, slightly, unusually long shoots, and supplying them annually with a copious mulching of well-rotted dung.

2019. The Boursault roses have long, reddish, flexible shoots, less decided climbers than the preceding divisions, but well adapted for pillar-roses. Blush Boursault, known also by half a dozen other names, is a fine pillar-rose; so is the crimson. Its clusters of large deep crimson or purple flowers are inclined to be pendulous, giving it a fine appearance. As a drooping standard, also, it is perfect. Gracilis is a hybrid of vigorous growth in good soils. These require very little pruning as pillars; the crowded spray should be cut out, and the long shoots shortened. As a standard, the long shoots are better left to their natural growth.

2020. The Double-white Banksian rose was introduced in 1807, the yellow in 1827. Its scentless straw-coloured flowers are, like the white, very small, and double; but they want its fragrant sweetness. Both bloom in May. A new yellow Banksian (Jaune serin) has large flowers, and is a vigorous grower; and in 1850, Mr. Fortune introduced a new white Banksian (*Rosa Fortuniana*), very double, as they all are, and as large as the Noisette Aimée Vibert, a very fragrant and most desirable variety.

2021. They are neither adapted for pillar nor standards, but grow luxuriantly on a south wall. They flower early, which exposes them to destruction by the spring frosts. They bloom freely in dry soils, and require careful pruning after flowering: most of the small twiggy branches require shortening: if superabundant, remove them altogether. The flowers generally abound on the small twiggy branches, which should be encouraged. Thick, strong shoots, produced in summer, should be removed in autumn, or immediately after the bloom is over if they bloom earlier, unless new wood is wanted to cover the walls.

2022. The hybrid climbers are strong hardy-growing roses. Wells's White, or Madame d'Arblay, makes gigantic growth in strong soil, and soon forms a pillar of the largest size. Wood's Garland, raised from the seed of a Noisette, is also a vigorous grower, and produces immense clusters of bloom of great fragrance, changing from white to pink.

§ 2.—CULTIVATION OF ROSES IN POTS.

2023. It was imagined for a long time that the rose was unsuited for pot-culture, and, accordingly, these beautiful objects were confined to the garden, where it was the object of the cultivator to encourage their blooming in the summer and autumn months. It is now found, however, that with all its hardihood and vigorous growth, the more delicate kind of roses can be grown to perfection in pots under a proper system of training and cultivation, and can, by judicious forcing, be made to bloom at all seasons. The required conditions are, to keep them from exposure to heavy rains, frost, or snow; but to let them have plenty of air, day and night, in open weather; that the soil should be suited to their respective wants, and that the forcing should be gentle, the heat being kept at about 40° at first, rising to 45° by night, and to 50° by sun-heat during the day, accompanying this with air whenever it can be given safely. The best compost for potting roses is a good stiff loam one bushel, rotten dung from an old hotbed one peck, and half a gallon of pigeon-dung, or double the quantity of sheep-dung, well decomposed. Another good soil is a turfy loam, rather stiff, and well-decomposed cow-dung in about equal parts. Either of these, with good drainage in the pots, gentle forcing, careful examination for insects, and keeping the trees well balanced and neatly trained and tied down to their supports, with constant attention to watering with liquid manure, as well as pure water, will produce abundance of bloom. All the strong-growing varieties, such as Hybrid Provence, Hybrid China, Hybrid Bourbon, French, Moss, Alba, Hybrid Perpetuals, and the strong-growing Bourbons and Noisettes, should be potted in autumn. The delicate Bourbons and Noisettes, together with the Tea-scented and Chinas, should be left till the spring. When the roses are had home for planting in the autumn, examine the stocks minutely, particularly among the roots, cutting out any decayed parts, all knots, the remains or rudiments of suckers; lopping any wounded or bruised roots, and cleaning all well over before potting, as no such opportunity will again offer. When planted, cut back the head about a third, and about the end of February or the beginning of March cut back to from two to four eyes. In potting, let the pots be well drained with from one inch to an inch and a half of broken crocks, used in large rough pieces, having the concave side downwards. The pots should not be over large,—from six to eight inches inside the rims will be sufficient, according to the size of the plant, condition of its roots, &c.

2024. Following the directions of Mr. Saul, in which every confidence may be placed, the plants, when potted, should be plunged to their rims in cold ashes, or any garden soil, on an inverted flowerpot, leaving a cavity underneath each to prevent the ingress of worms. In this state they should remain till about the middle of May, when they will require a shift. The same soil as before should be used, but, if possible, more rough, and they should be again plunged to the rim. During summer they will require constant attention as to watering; they should have liquid manure at least once a week, using soft water at other times. The best liquid manure is the drainage of dunghills, sheep- or cow-dung, steeped in water, and drawn off clear. Guano is excellent, but it requires great caution in using, owing to its variable quality. If, therefore, it is used, err on the safest side, and give it weak,—half a pound of guano to eight or ten gallons of water. During summer the plants require constant attention in taking off all suckers as they appear, as well as all flower-buds, they not being intended to bloom this season. If the plants are too crowded with wood, they should be thinned out moderately, so that the remaining shoots may the better perfect their growth. All strong, gross, or watery shoots, should have their extreme points pinched off before they get long,—say at six or eight inches: they will soon break out afresh, and add to the bushiness of the plant. If all goes well, these plants will, about the beginning of August, require another shift, which should not be over large. They must be treated in every respect as before until the end of September, when they should be shifted into their blooming-pots.

2025. The delicate varieties, such as the Bourbons, Noisettes, Teas, Chinas, should be procured and planted in spring, and put in a cold frame or pit, and kept rather close for a few days or a week until the plants recover from the effects of the journey; after which they must have abundance of air, and in about a fortnight they may be safely shifted. The best soil is that recommended above for others; namely, rough turfy loam and well-decomposed cow-dung, with the addition of from one-fourth to one-third leaf-mould. This soil is especially suitable for the delicate Teas, &c.: strengthening food can be given in the shape of liquid manure during the season of growth. This shift should not be a liberal one; but the size of the pots must be regulated by the size of the plants, the state the roots are in, or whether they are Bourbons or Teas, as the former will, in general, take a more liberal shift than the latter. When potted, they must be put in a cold pit, and kept near the glass, running the lights off every fine day, and tilting them up in bad weather, in order to give the plants as much air as possible. At night the lights must be kept on until the middle of May, for fear of spring frosts. From the second to about the third week in May, the lights should be considerably tilted at night, after which they may remain off altogether, except during heavy rains, when they should be put on.

2026. During summer the plants will require the same attention as those already noticed; namely, disbudding, thinning out the shoots moderately where over-crowded, pinching off the points of strong shoots, and syringing with a mixture of tobacco-liquor and water in equal parts whenever green-fly appears. About the middle of June these plants will require another shift, which should be more liberal than the preceding, more particularly to those which have grown freely. The same kind of soil as before should be used, and the same routine of treatment followed. Manure-water must be given from the time they receive their first shift in spring, and continued through the summer. At first it should be given but seldom,—once in ten days or a fortnight; but as the plants progress in growth, it should be given once a week, and continued until the end of September, watering with soft water in the intervening time.

2027. At the end of September, both collections must be shifted into their blooming-pots. Great care must be taken with this shift, as much of the health and beauty of the plants will depend on how this is performed. If it is not properly executed, it will be useless to expect bloom next season, and all past trouble and attention will have been in vain. The size of the pots will vary according to the strength of the plants, their classes, &c. The Teas, Chinas, &c., if good plants, which by this time they ought to be, may go into pots about nine inches in diameter; the Perpetuals and Summer roses into pots about 12 inches, whilst some of these latter classes will be strong enough to go into pots 15 inches or more in diameter. Drain well, putting in at least two inches in the 9-inch pots, and three inches in the larger sizes; and using larger pieces of crocks, keeping the concave side downwards. The soil to be used the same as before,—stiff loam and cow-dung for the strong growers; the same, with the addition of leaf-mould, for the delicate growers. The mould must be chopped very rough, and thoroughly mixed.

2028. The following is a description of the mode of potting:—Having placed the compost on the potting-board, procure a quantity of turfs as they are brought in from the field, and some very rough, dry, and well-decomposed cow-dung. The pots being drained, tear off one or two large pieces of the turf, and put them into the bottom of the pot on the drainage, top downwards. In general this will be of sufficient height for the ball of the plant to rest upon; if not quite high enough, put in a little mixed material to raise it to the required height. Next, tear off pieces of turf six or seven inches long, and two or three inches wide, and as many thick. About four such pieces should be crammed in between the ball and the sides of the pot, perpendicularly. Between this place large pieces of rough cow-dung, nearly equivalent in bulk to the size of the loam, and fill up all crevices and cavities with the mixed compost, finishing off with the same, and making the whole quite firm. This is to be the treatment of the strong-growing varieties. The Teas, Chinas, &c., may be potted in the same way, except leaving out a portion of rough cow-dung, and using more of the mixed material in its place. The great use of this rough potting during the following season of growth will be apparent, allowing, as it does, water, whether soft or liquid manure, to pass freely through, and admitting the air to act upon the roots.

2029. In September the plants ought to be properly trained,—those intended for climbers, such as the Hybrid Chinas, Hybrid Bourbons, and strong-growing Noisettes, round neat stakes three to four feet high. If these have been thinned during the previous summer, they will now require little or no pruning, but merely to have their branches tied neatly and regularly round, shortening the extreme points. Any very strong-growing perpetual or other summer roses may be trained in a pyramidal form by placing stakes round the side of the pots, from two to two and a half feet high, and making them meet at top, passing a hoop round them at about a foot and a half from the pot. The branches must be tied down to the rim of the pot, and round the stakes up to the summit, bearing in mind to keep the branches well down, as there will be no difficulty in filling up the top the following spring. These, like the others, do not require much pruning ;—thinning out where crowded, shortening where too long, and regulating the branches, will be enough. This applies also to the less robust hybrid perpetuals, Bourbons, Chinas, Teas, &c. The plants being all young, the wood thinned out and stopped when necessary during the previous summer, they only require to be properly trained, with a little shortening.

2030. The plants will now require to be placed in their winter habitation ; and nothing is better than a cold pit facing the south, the lights being at a very acute angle, in order to catch every ray of light and sun. Let the plants be placed upon inverted pots as close to the glass as possible, keeping the delicate varieties, as the Teas, Chinas, &c., at one end by themselves. Leave the lights off night and day during the autumn, except in case of rains, from which they must be carefully protected. During the winter the lights must be off all day in settled weather, and tilted up by night, shutting close only in case of very severe frosts and wet ;—slight frosts are not injurious. Through the winter they require little or no water, and it should be given only when the mould is very dry. The great objects of the winter treatment are to protect the plants from rain, to give very little water, and to allow them plenty of air.

2031. About the end of February many of the perpetuals, Bourbons, Chinas, Teas, &c., will commence growing, and the slight protection which they have will facilitate this. About this time they should receive a surfacing of rotten cow-dung, from one and a half to two inches in depth ; taking out a portion of the mould to make room for it, particularly by the rim of the pot. If it is desired to have a portion of the plants in bloom early, the end of February is an excellent time to remove them into a warm greenhouse : a span-roof house is the best. But, to return to the plants in the pits : as they progress in growth, they must be frequently looked over, tying the lowest branches of all down to the rim of the pot ; and the other branches of the dwarf roses, neatly and regularly down to them, but not leaving the centre open or bare. The pyramidal plants should be trained regularly from the rims round the sticks to the summit, and the climbers in a similar way: they should also be turned round once or twice a week, to prevent them getting one-sided. Through the spring, while the plants are growing, particularly in March and April, the admission of air must be regulated with caution; the young shoots being extremely soft, the cold harsh winds of March would be very injurious to them. By night they should be shut close to avoid spring frosts, which are more injurious when the plants are so far advanced, than 12° or 15° of frost would be in the depth of winter. At the same time no opportunity should be lost of removing the lights from the whole collection every fine day, and for as long a time as possible, that the shoots may not be weak or drawn. They should be exposed to all the light possible, and to soft rains, which are very beneficial.

2032. By the middle of April, all danger from severe frosts being past, the lights should be tilted up all night at the back, and kept off as much as possible during the day. By the beginning of May the pots may be removed from under the plants, and the pots containing the plants set on the bottom of the pit, providing it is not too far from the glass,—not more than nine inches. From the end of April to the blooming of the last plants, the pit, morning and evening, should be sprinkled every fine day, round the sides, on the ground, and over the foliage of the plants: this should be performed with a very fine rose-pot or a syringe. In wet or cold weather this must not be done, as mildew would be the consequence. All strong watery shoots, as they make their appearance, should have their extreme points pinched out when six inches long; and through the whole season of growth continual attention is necessary to tying, training, and taking off the suckers of worked plants as soon as they appear. From the commencement of their growth to the end of the blooming time, as soon as the least sign of green-fly is visible, they must be fumigated with tobacco-smoke, and the buds closely examined for the larvæ of insects. As the season advances, give shade in sunny weather for a few hours in the middle of the day; and as the buds open, move them into a colder and more shaded part of the house to bloom: a cold pit facing the north answers the purpose.

2033. When the roses have bloomed, cut off all dead flowers, and place the pots in a pit where they can have plenty of air and light, and where they can perfect their growth and ripen the young wood. Here they should have a copious supply of liquid manure once a fortnight until their growth is completed, all suckers and straggling shoots being cut off, when they may be placed out of doors till the end of September, at which time they will require fresh potting, the balls being reduced a little in the operation, some of the old wood being cut out, and the young wood shortened, thinned out, and tied down as before.

2034. The Cloth of Gold and Solfaterra should not be allowed to get overcrowded with wood. In spring, thin out and shorten the branches, tying down a portion of the shoots to the rim of the pots. Stop all shoots at nine or twelve inches, tying them neatly down to their proper places, giving liquid manure whenever required.

2035. In the following list of roses, adapted for pot-culture, they are arranged in classes suitable for climbers, for dwarfs, and for pyramids. In both cases the Bourbons, Chinas, Teas, and Noisettes of the autumnal-blooming or perpetual kinds prevail; for not only are they beautiful in autumn, but in summer also; and they are preferable for pot-culture to those known as Summer roses:—

Climbing Roses suited for pot-culture.

China.

Blairii No. 2,—pink-blush.
Chênedole,—brilliant crimson.
Comtesse de Lacepède,—silvery blush.
General Allard,—bright rose.
General Jacqueminot,—deep lake.
Gloire de Couline,—brilliant carmine.
Hypocrate,—bright rose.
Jenny,—rosy blue.
Léopold de Bauremont,—rosy pink; very double.
Magna rosea,—delicate blush.

Bourbons.

Charles Duval,—rose.
Coupe d'Hèbe,—delicate flesh.
Elizabeth Plautier,—dazzling crimson.
Great Western,—reddish crimson.
Henri Barbet,—rosy crimson.
Paul Perras,—brilliant rose.
Paul Recaut,—scarlet crimson.
Tippoo Saib,—rosy crimson.

Alba.

Madame Audot,—pale flesh-blush.
Madame Legras,—pure white, centre pale lemon.

Damask.

Ville de Bruxelles,—bright rose.
Madame Stultz,—pale lemon.
Madame Zoutman,—cream.

Bourbon.

Bouquet de Flore,—bright carmine.
Le Grenadier,—purplish crimson.
Pierre de S. Cyr,—glossy rose.
Pourpre parfait,—very deep purplish crimson.

Noisette.

Caroline Marniesse,—creamy white; blooming in clusters.
Cloth of Gold,—clear yellow.
La Marque,—lemon; large, full centre.
Phalos,—white, shaded with lemon.
Pourpre de Tyre,—purplish crimson.
Solfaterre,—bright sulphur.
Triomphe de Duchère,—pale rose; flowering in large clusters.

Dwarfs and Pyramids.

Moss.

Blush,—pinkish blush.
Celina,—purplish crimson.
Crested,—rose.
Laneii,—deep carmine.
Princess Royal,—bright salmon; large and double.
Prolific,—rose; very large.

French.

Boule de Nanteuil,—purplish crimson.
D'Aguesseau,—brilliant crimson.
Eulalie le Brun,—rosy pink.
Grain d'Or,—brilliant crimson.
Grandissima,—dazzling crimson.
Kean,—crimson scarlet.
La Circassienne,—rosy pink.
Œillet parfait,—white, shaded with rose and red; unique.
Oracle du Siècle,—rich crimson; large and full.
Pharnices,—crimson; very large.

Provence.

Blanchefleur,—white; delicate blush in the centre.
Comte Plater,—cream.
Pauline Garcia,—white; centre straw-colour.
Princess Clementine,—pure white.

Perpetuals.

Amandine,—blush, with pink centre; large and full.
Baronne Prevost,—clear bright rose-colour; glossy, large, and full; of erect habit and robust growth; one of the largest roses.
Comte Montalivet,—purplish crimson, shaded with violet and red; very large, double, and globular, and of branching habit.
Comet,—bright rose; large and fragrant.
Duchesse de Montpensier,—glossy blush; very large and full; of erect habit and vigorous growth; a beautful rose, and very sweet.
Duchess Sutherland,—bright rose, mottled.
Géant de Batailles,—belonging to the Rosomenes,—a dazzling crimson, approaching to scarlet, shaded with purple-velvet; very large and double.
Jeanne d'Arc,—delicate blush, nearly white as it fades; large, full-cupped, and very sweet; not easily grown.
Lady Alice Peel,—bright carmine; large, full and cupped; of erect habit, and very sweet.
Standard of Marengo,—brilliant carmine-

lake, often shaded: very double, and cupped; a beautiful rose.

Caroline de Sansil,—clear flesh-colour, edged with blush; large, full, and compact; of robust habit.

Cherreau,—cherry-colour, changing to rose; large, full, and cupped.

Gigantesque,—deep rosy crimson.

Léonore d'Este,—blush colour, with pale edges; large and full.

Mrs. Campbell of Islay,—rose-lilac, marbled.

Bourbon.

George Cuvier,—rosy crimson or cherry, tinged with light purple; large, full, and compact; of fine habit and foliage.

Henri Lecoq,—clear light carmine; large, full, and cupped.

Le Grenadier,—clear crimson-lake, opening scarlet; double, and of remarkably rich colour.

Le Maréchal du Palais,—delicate rosy blush; large, and cupped.

Madame Nerard,—silvery blush, with a shade of delicate pink; large, very double, cupped, and sweet.

Queen,—fawn, shaded with salmon; large, double, and finely cupped; very sweet, and of beautiful habit.

Souvenir de Malmaison,—white in the margin, approaching flesh; centre fawn-colour; very large, full, and compact, with large thick petals and fine foliage.

Vicomte de Cazes,—cherry-red.

Souchet,—purplish carmine, sometimes brilliant crimson; glossy; very large, full, and compact, and sweet.

Marianne,—bright rosy pink, in clusters; very large, double, and cupped, and fine foliage.

China.

Mrs. Bosanquet,—white, with delicate flesh-coloured centre; large, full, and cupped; very sweet, and a fine bloomer.

Clara Sylvain,—pure white, very clear; large, full, and cupped; a fine rose.

Madame Bréon,—clear rose-colour, sometimes tinged with salmon; large, full, and compact, with fine foliage.

Eugène Beauharnais,—bright lake, or amaranthine; beautiful in the bud; dying off blackish crimson; large, double, and cupped.

Archduke Charles,—light rose, margin white at first, changing to brilliant crimson; very large and full.

Cramoisie supérieure,—dark velvety crimson; very double, cupped; exquisite in the bud; tea-scented.

Adam,—rosy blush, approaching to salmon-colour; large, full, globular, and very sweet.

Abricote,—bright fawn, fleshy margin; large, cupped, and double.

Comte de Paris,—delicate blush or flesh-colour, shaded with rose; large, full, and cupped.

Devoniensis,—creamy white, buff centre, sometimes yellowish; large, full-cupped; a splendid rose.

Eliza Sauvage,—cream-colour, with centre deep orange, sometimes buff; large, full, globular, and of delicate habit.

Goubalt,—salmon-colour, and very fragrant.

Josephine Malton,—rich creamy-white, with darker creamy centre, sometimes inclining to buff; petals tinged with lake; large, double, and cupped.

Mirabile,—rosy fawn, edged and shaded with rose-colour; full and cupped.

Mondor,—from cream-colour to blush, with fawn centre, sometimes tinged with lake; large, double, and cupped.

Niphetas,—creamy white, large; centre pale lemon; large, full, globular, and magnolia-like.

Nerida,—rosy buff, and fawn-shaded: very large, double, and cupped; of fine foliage, and deliciously fragrant.

Pellonia,—cream-colour, with yellow centre, tinged with flesh-colour; double, globular, and very sweet.

Perfection,—bright apricot-colour, with buff edges; double, cupped, and very sweet.

Princess Adelaide,—fine yellow or rather straw-colour; paler on the margin; large, full, and cupped, and very sweet.

Sofrano,—deep fawn, approaching to saffron in the bud, changing to pale buff; large, and very double.

Vicomtesse de Cazes,—deep golden yellow, sometimes tinged with copper-colour; large, double, and cupped.

Madame de St. Joseph,—pale salmon-pink, with deeper centre, dying off apricot-colour; large and double.

Madame Villermoz,—white, with fawn or salmon centre; large, full, and cupped; very thick petals and fine foliage.

Noisette.

Aimée Vibert,—pure white, flowering in clusters; of medium size and dark-green foliage; a noble standard.

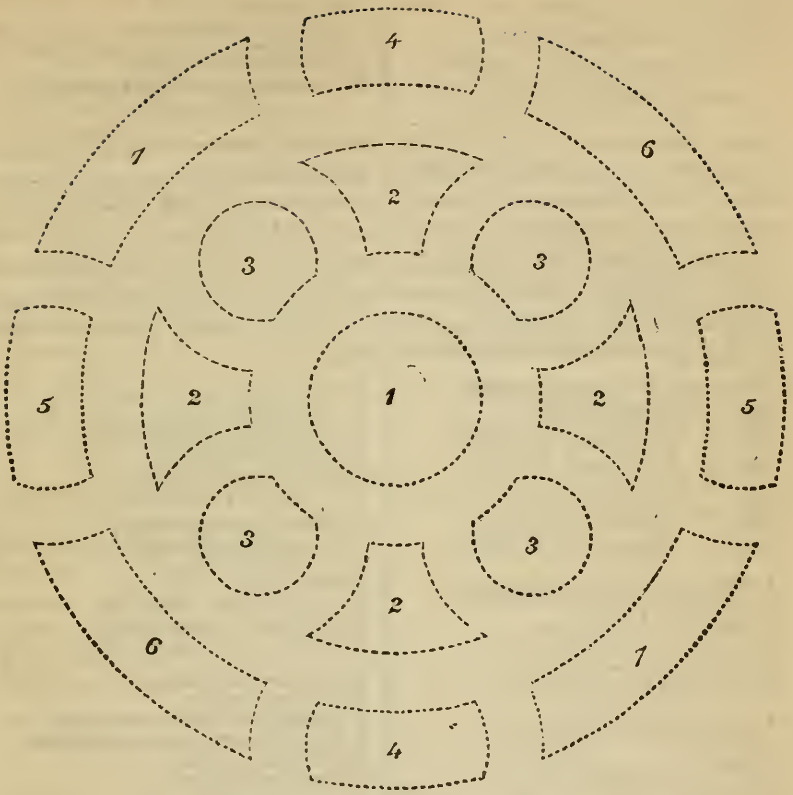
Clara Wendel,—pale yellow, approaching cream-colour; centre sometimes fawn, sometimes deep yellow; cupped, and very sweet

Miss Glegg,—white, with centre pale rose, sometimes flesh-colour, and of dwarf habit.

Narcisse,—very pale lemon-colour, with yellow centre; full and cupped.

Ne plus ultra,—cream-white, dwarf habit; cupped, and very sweet.

Victorieuse,—delicate blush flesh-colour, changing to white; cupped, large, and double.



CIRCULAR GROUP OF FLOWER-BEDS.

CHAPTER XXXV.

HARMONIZING COLOURS IN FURNISHING FLOWER-BEDS.

2036. Resuming the subject which I left unfinished at page 557, the largest ribbon border, as is there stated, rises from front to back, eleven rows deep, bounded on one side by a terrace walk fourteen feet wide, and on the other by a gravel walk five feet wide, furnished during the present year as already described. In 1861 the same border was furnished as follows .—

1. Lobelia speciosa.
2. Golden Chain Geranium.
3. Alyssum variegatum.
4. Verbena,—Purple King.
5. Geranium,—Flower of the Day.
6. ,, Brilliant.
7. Calceolaria aurea floribunda.
8. Perilla nankinensis.
9. Ageratum mexicanum.
10. Dahlia,—White Zelinda, ⎫ Crystal
11. ,, Scarlet do., or ⎭ Palace.

2037. The following was the arrangement in 1860:—

1. Alyssum variegatum.
2. Lobelia speciosa.
3. Golden Chain Geranium.
4. Brilliant.
5. Flower of the Day.
6. Thom Thumb,—scarlet ditto.
7. Calceolaria Caie.
8. Love lies Bleeding.
9. Ageratum.
10. Dwarf yellow Dahlia.
11. Scarlet Dahlia (Crystal Palace).

2038. This was very much admired, and there was something very rich in the four rows of geraniums together. The Golden Chain was not allowed to flower. Its yellow leaves formed a nice setting for the lobelia and the dazzling rows of brilliant scarlet behind it. This line of scarlet again was separated from the Tom Thumbs by the silver leaves and soft colour of the Flower of the Day. Each of the scarlets was thus brought out in surpassing brightness, and threw a bright warm glow of rich splendour over the entire border. Other ribbons have been planted, thus:—

1st row,—Cerastium tomentosum.
2nd ,, Lobelia speciosa.
3rd ,, Golden Chain Geranium.
4th ,, Tom Thumb Geranium.
5th ,, Calceolaria aurea floribunda.
6th ,, Perilla nankinensis.
7th ,, Ageratum mexicanum.
8th ,, Dahlia,—Purple Zelinda.

1. Mangles' variegated Geranium.
2. Tropæolum elegans.
3. Verbena,—Purple King.
4. Geranium,—Tom Thumb.
5. Calceolaria integrifolia.
6. Trentham Rose Geranium.

1. Golden Chain Geranium.
2. Brilliant ,,
3. Calceolaria amplexicaulis.
4. Dahlia,—Purple Zelinda.
5. Pentstemon gentianoides coccineum.
6. Ageratum mexicanum.
7. Dahlia,—Mrs. Labouchere.

1. White Campanula carpatica, succeeded by Alyssum.
2. Baron Hugel's Geranium.
3. Calceolaria rugosa.
4. Ageratum mexicanum.
5. Yellow Chrysanthemum.

1. Golden Chain Geranium.
2. Purple King Verbena.
3. Brilliant Geranium.
4. Mrs. Holford's Verbena.
5. Lady Colville's Geranium.
6. Calceolaria amplexicaulis.
7. Trentham Rose Geranium.

1. Alyssum variegatum.
2. Lobelia speciosa.
3. Calceolaria,—Prince of Orange.
4. Geranium,—Brown's compactum.
5. Cineraria maritima.
6. Perilla nankinensis.

1. Purple King Verbena.
2. Mrs. Holford.
3. Mrs. Woodroof, or Defiance.
4. Flower of the Day Geranium.

2039. Ribbon borders are often divided in the middle, either by festoons of climbers, or by merely using the tallest plants for the centre. The narrowest ribbons given here might thus cover a border double the width, by merely making the back line to be the centre, and planting the other side in the same manner as the front, only reversing the order. Thus beginning at the front:—

1st row,—Golden Chain Geranium.
2nd ,, Purple King Verbena.
3rd ,, Brilliant Geranium.
4th ,, Calceolaria amplexicaulis.
5th ,, PinkNosegayGeran. (centre).
6th row, Calceolaria amplexicaulis.
7th ,, same as 3.
8th ,, same as 2.
9th ,, same as 1.

2040. The same colours are also often repeated in ribbon borders; as scarlet, white, scarlet, white, red, white, blue, white, red, blue, &c.

2041. The following arrangement was much admired at Kew Gardens last season :—

Purple King Verbena.
Robinson's Defiance Verbena.
Cineraria maritima.
Perilla nankinensis (centre).

Cineraria maritima.
Robinson's Defiance Verbena.
Purple King Verbena.

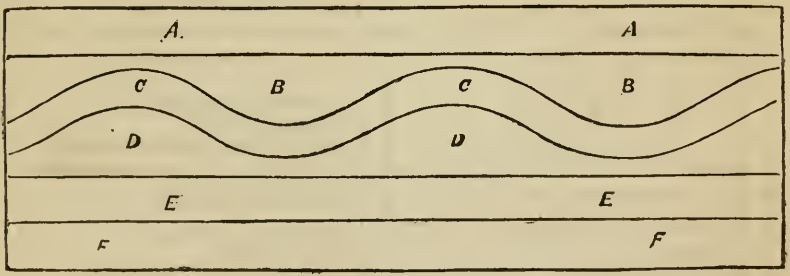
2042. Two or more rows of the same plants are often planted together, to give wide bands or stripes of colour. Where space is ample, this has a magnificent effect. Bands, three rows, or two feet wide, of the following sorts, would look chaste and rich :—

1. 3 rows of Mangles's variegated Geraniums.
2. 3 rows of Purple King Verbena.
3. 3 rows of Calceolaria amplexicaulis.
4. 3 rows of Perilla, rising highest at the back.

1. 3 rows of Purple King Verbena.
2. 3 rows of Calceolaria amplexicaulis.
3. 3 rows of Ageratum mexicanum.
4. 3 rows of Punch's Geranium.

1. 3 rows of Lobelia speciosa.
2. 3 rows of Golden Chain Geranium.
3. 3 rows of Purple King Verbena.
4. 3 rows of Flower of the Day Geranium.
5. 3 rows of Perilla nankinensis.
6. 3 rows of tall yellow Chrysanthemum, or Dwarf Pillar Dahlia.

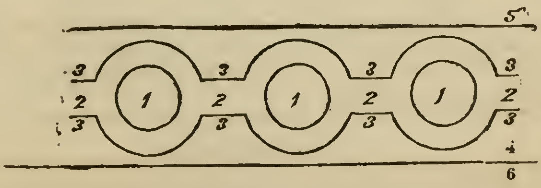
2043. The monotony of straight lines or bands of colour is often broken by the introduction of one or more curved or waving lines in straight border, as in the following example :—



LONG RIBBON BORDER.

A. Ageratum. B. Geranium,—Trentham Rose. C. Perilla. D. Yellow Calceolaria. E. Brilliant. F. Alyssum and Lobelia mixed.

2044. Again, ribbon borders are furnished in this manner. Small circles are marked out at any given distance all along the centre of the border, thus :—



These are planted either entirely with one colour, or with one or more colours. A smaller circular patch intermediate between the central circle, filling up the angles, is occupied by No. 3, while No. 4 fills up all the remaining space. This was planted as follows:—

1. Calceolaria amplexicaulis.
2. Geranium,—Purple Nosegay.
3. ,, Alma (single plants).
4. That is, the whole of the space not otherwise occupied, called the ground-colour,—Verbena pulchella.

2045. The planting of this group of beds in 1861:—

1. Centre—Scarlet Geranium, with Trentham Rose; ring of Flower of the Day, and a ring of Alyssum.
2. Yellow Calceolaria, edged with Purple King Verbena.
3. Geranium (Excellence), edged with Cineraria maritima.
4. Calceolaria (Crimson King), edged with Calceolaria (Prince of Orange).
5. Mangles' Variegated, edged with Verbena pulchella.

2046. Another example of this;—6 being below the line, and 4 above it.

1. Calceolaria aurantia multiflora.
2. Lobelia speciosa.
3. Variegated Alyssum.
4. Scarlet Geranium.
5. Silver Queen Dahlia.
6. Golden Chain Geranium.

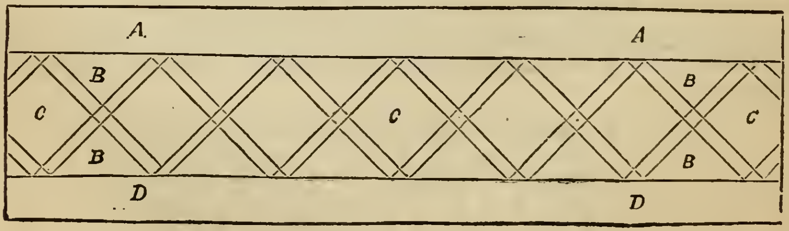
2047. Generally, only three colours are used for this style of planting. Thus:—

1. Scarlet Geranium.
2. Yellow Calceolaria.
3. Lobelia speciosa, or Purple King Verbena.

2048. Sometimes, too, another row or two may be run along at both sides of such borders. Thus:—

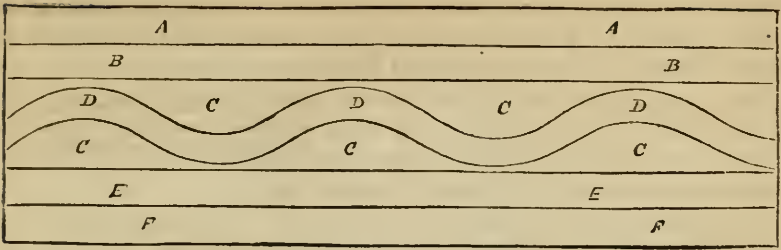
4. White Verbena.
5. Alma, or Bijou Geranium.

2049. Almost any design or figure may be worked into a ribbon border, merely by the mode of planting, without the intervention of either edgings or gravel. I have heard of a gardener who had only one large flower-bed, but he converted that single bed into a new geometrical flower-garden every year by his manner of planting alone. The following sketches, with the modes of planting, are not designed to exhaust, but merely to suggest ideas for this mode of treatment. Cutting out the border into spaces is sometimes called *panel*-planting; but the application of the system is endless:—



TERRACE RIBBON BORDER.

A. Ageratum. B. Scarlet Geranium. C. Calceolaria. D. Cineraria maritima.
The zig-zag lines being planted with Perilla.



DOUBLE RIBBON BORDER.

A. Alyssum and Lobelia. B. Brilliant. C. Yellow Calceolaria. D. Perilla.
E. Brilliant. F. Alyssum and Lobelia mixed.

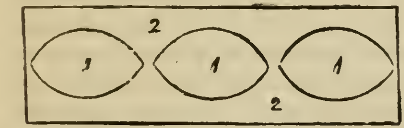
2050. Or this border might be furnished thus :—Four curved lines, D, might be introduced instead of one, and planted as follows :—

D. Geranium,—Brilliant.
D 1. Yellow Calceolaria.
D 2. Perilla nankinensis.
D 3. Trentham Rose Geranium.

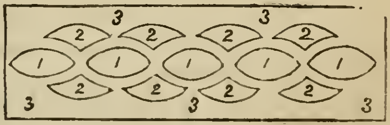
2051. In this case the front and back could be thus planted :—

A. Prince's Feather.
B. Ageratum.
C. Cineraria maritima (back).
F. Lobelia speciosa (front).
E. Golden Chain Geranium.
C. Cerastium tomentosum.

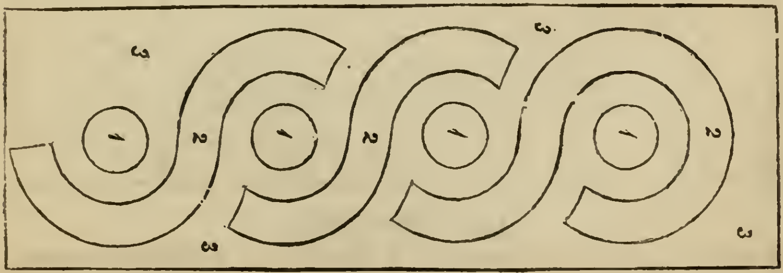
2052. There is something very striking in this mode of furnishing. The dark foliage of the Perilla renders it a most useful plant for this purpose. The Atriplex rubra is equally so, if it can only be kept from a premature death from its excessive seed-bearing. The Cineraria maritima, Centaurea argyrea, and most of the silver and gold-leaved geraniums, are also striking in the same position. Either of the following designs would also look well in a straight border :—



1. Robinson's Defiance Verbena.
2. White Verbena.
3. Edged all round with Lobelia speciosa.



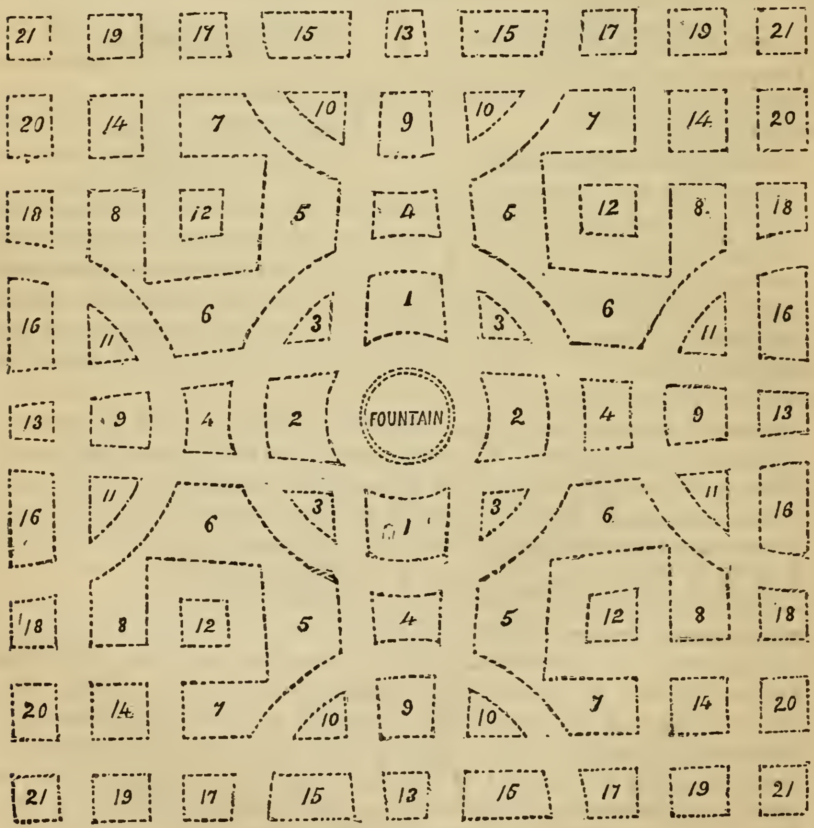
1. Scarlet Geranium.
2. White Verbena.
3. Purple King Verbena.



1. Scarlet Verbena. 2. Gazania splendens. 3. Lobelia speciosa,

2053. Whatever plants are used for partitioning off or defining spaces on borders, they must be distinct from those filling up the insterstices. This point secured, it is of comparatively little importance what is used; only I think, as a rule, the dividing plants should be at least as high, or a little higher than the others. I have seen them clipped lower, which I consider bad taste. The idea of complete separation demands that the barrier shall be high enough and strong enough to insure this object. Hence, too, where the patches of plants are large and massive, the subdividing lines should be from three to five deep, instead of a single line. No general rule can be laid down: a cultivated taste on the spot alone can determine the relative proportions that the principles of congruity would require.

2054. But I must hasten on to give an example or two of the grouping of flower-gardens and detached groups of beds.



DUTCH FLOWER-GARDEN,

At the seat of Col. Sowerby, Putteridge Bury, Herts; Mr. Robert Fish, gardener.

1. Geranium (Excellence); edged with Scarlet Nasturtium.
2. Geranium (Brown's Compactum); edged with Yellow Nasturtium.
3. Geranium (Pink Nosegay); edged with Geranium (Hendersonii).
4. Heliotrope (Triomphe de Liège); edged with Cineraria maritima.
5. Calceolaria (Crimson King); edged with Yellow Hawkweed.
6. Calceolaria Caie; edged with Cineraria ameloides.
7. Alonsia (scarlet); edged with Musk.
8. Purple King Verbena; edged with Cuphea strigillosa.
9. Geranium (Mrs. Colville); edged with Golden Chain.
10. Geranium (Alma); edged with Saponaria calabrica.
11. Geranium (Flower of the Day); edged with Saponaria calabrica.
12. Verbena (Mrs. Holford); edged with Verbena (Charliewoodii).
13. Geranium (Judd's Scarlet); edged with Verbena (Purple King).
14. Geranium (Tom Thumb); edged with white Ivy-leaf.
15. Calceolaria (Aurea floribunda); edged with Lobelia.
16. Calceolaria (Prince of Orange); edged with Lobelia.
17. Verbena (Ariosto); edged with white Alyssum.
18. Verbena (Lord Raglan); edged with Heliotrope (Voltairiana).
19. Geranium (Pink Cup); edged with pink Ivy-leaf.
20. Geranium (Hackness); edged with Golden Chain.
21. Gazania splendens; edged with Lobelia speciosa.

2055. It will be observed that in the grouping of this garden, each corresponding bed is filled in the same manner; not only the two halves, but the four sides are the same. In regular figures, loooked down upon as this is, I think this is the best course to adopt: it would be difficult to assign any good reasons for furnishing it otherwise. Identity of form and position seems to demand identity of colour, when, as here, sufficient space intervenes to allow of the introduction of different hues between the same beds. Nothing whatever could be gained in having any of the No. 12, for instance, different from the others. By having them all alike, the symmetry and balance of the whole is maintained. The only other legitimate way of furnishing this garden would be to divide it into two halves, and furnish each half alike, and the two halves as different as possible. In that case, all the beds, Nos. 1, 2, 3, 4, 9, and 13, might form an independent or neutral arrangement, serving to divide the garden into two, or rather four parts; and then each half would be furnished to contrast with the other. However, I prefer the arrangement that is here given, and have furnished a large geometrical flower-garden on the same principle for years. It is no demerit, but the reverse where the garden is large, to have four beds alike. Where beds of the same shape occur together, as at 14, 19, 20, and 21, of course no one would dream of filling them all with the same colour. It may, however, be of the first importance to furnish them with plants of similar habit.

2056. It will also be observed, that in this arrangement most of the beds are furnished with an edging of a complementary or contrasting colour. This, while it heightens the individual effect of each bed, also, when skilfully managed, intensifies the brilliance of the whole. However, it is not always advisable on small beds; and I think that of late years the desire for edgings, and for cutting up beds into bands of colours, has run to excess. Instead of well-defined satisfying masses of beauty, of sufficient *size for the eye complacently to rest upon,* we are presented with *running* bands, giddy *mazes,* and heterogeneous mixtures of colour, that perplex, distract, and weary our sense of vision. In their zeal to *relieve* masses of colour by their complementaries, many seem to overlook the fact, that this implies the existence of masses to be relieved. A bed of scarlet verbenas a yard square requires no white band to *tone it down.* An entire bed of white of the same size, four feet distant, will do this more effectively. Distinctness of character, and an increase of beauty without confusion, would then be the result. These remarks are not, however, applicable to large beds; nor single regular or irregular beds, on garden or lawn. Generally, perhaps these, especially of a circular form, are most effective planted on the band or ring principle.

2057. The best examples of this kind of planting I have ever seen were also at Putteridge Bury. A double row of circular beds, raised in the centre, bounds one of the main walks for a considerable distance. The whole of them were furnished with *starers* in the centre, and, when furnished, assumed the shape of a cone rising to a sharp point in the middle. The following is the furnishing of a dozen of them for the years 1859, 1860, and 1861:—

2058. Two rows of circular beds on the lawn were planted in the following manner in 1859:—

1. *Centre*, Scarlet Geranium.
   Verbena, Defiance.
   ,, Mrs. Holford.
   Next to grass, Verbena,—Ariosto.
2. *Centre*, Light Fuchsia.
   Salmon Nosegay Geranium.
   Scarlet Ivy-leaf Geranium.
   Next to grass, Golden Chain.
3. *Centre*, Nasturtium Lobbii.
   Yellow Chrysanthemum.
   Purple Pentstemons.
   Cuphea, a slaty centre.
4. *Centre*, Dark Fuchsia.
   Ageratum mexicanum.
   Punch Geranium.
   Cineraria maritima.
5. *Centre*, Tall Geranium.
   Punch Geranium.
   Calceolaria angustifolia.
   ,, Indian Chief.
6. *Centre*, Brugmansia.
   Scarlet Salvia fulgens.
   Blue Salvia patens.
   Calceolaria amplexicaulis.
7. *Centre*, Brugmansia Knightii.
   Ageratums.
   Calceolaria angustifolia.
   Geranium,—Flower of the Day.
8. *Centre*, Tall Geranium.
   Scarlet Geranium.
   Prince of Orange Calceolaria.
   Heliotrope,—Voltairianum.
9. *Centre*, Dark Fuchsia.
   Ageratum.
   Salmon Nosegay Geranium.
   Cineraria maritima.
10. *Centre*, Tall Geranium.
   Scarlet Geranium.
   Calceolaria, —Yellow Prince of Orange.
   Perilla nankinensis.
11. *Centre*,—Light Fuchsia.
   Trentham Rose Geranium.
   Purple Nosegay Geranium.
   Golden Chain.
12. *Centre*, Scarlet Geranium.
   Verbena,—Lord Raglan.
   ,, Mrs. Holford.
   ,, Custine.

The centre plants are standards.

2059. Two rows of circular beds as they were planted in 1860:—

1. *Centre*, Tall Nosegay Geranium.
   Salmon Nosegay Geranium.
   Jackson's Variegated.
   Next to grass, Hackness Geranium.
2. *Centre*, Dark Fuchsia.
   Calceolaria,—Indian Chief.
   ,, Caie.
   Next to grass, Geranium,—Brilliant.
3. *Centre*, Brown's compactum Geran.
   Flower of the Day.
   Next to grass, Golden Chain.
4. *Centre*, Dark Fuchsia.
   Salmon Nosegay Geranium.
   Scarlet Variegated Geranium.
   Next to grass, Pink Nosegay Geranium.
5. *Centre*, Brugmansia.
   Ageratum variegatum.
   Ageratum, blue.
   Calceolaria amplexicaulis.

6. *Centre*, Dark Fuchsia.
   Scarlet Geraniums, with an edging of Cineraria maritima.
7. *Centre*, Brugmansia.
   Scarlet Salvias.
   Blue Ageratums.
   Calceolaria amplexicaulis.
8. *Centre*, Tall Scarlet Geranium.
   Geranium,—Trentham Rose.
   ,, Flower of the Day.
9. *Centre*, Dark Fuchsia.
   Calceolaria,—Indian Chief.
   ,, Prince of Orange.
   Calceolaria,—aurea floribunda.
10. *Centre*, Trentham Rose Geranium.
   Trentham Rose ,,
   Commander-in-Chief ,,
   Baron Hugel ,,
11. *Centre*, Dark Fuchsia.
   Old Diadematum Geranium.
   Diadematum rubescens.
   Queen ,,
12. *Centre*, Geranium,—Defiance.
   ,, Punch.
   Edged with ,, Alma.

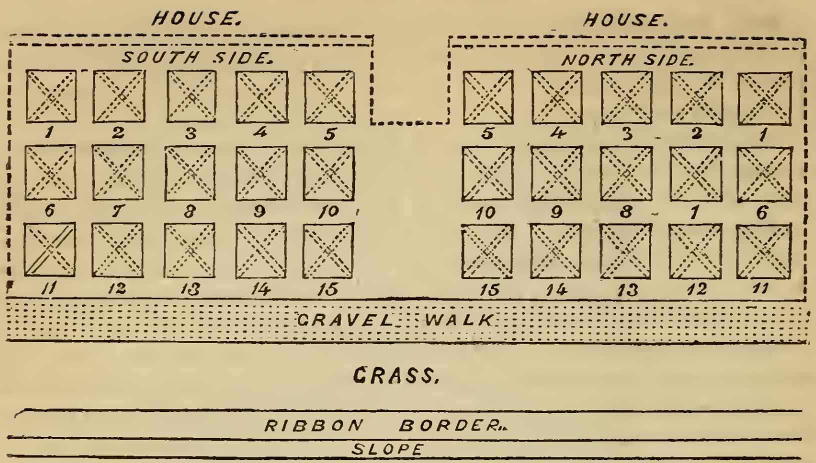
The centre plants are standards. These beds are planted in bands.

2060. The same beds were thus furnished in 1861:—

1. *Centre*, Salmon Nosegay Geranium.
   Calceolaria,—Crimson King.
   ,, Prince of Orange.
   ,, aurea floribunda.
2. *Centre*, Brown's Compactum Geranium.
   Geranium rubens.
   ,, Flower of the Day.
3. *Centre*, Brugmansia.
   Ageratums.
   Purple Pentstemons.
   White ,,
   Red ,,
4. *Centre*, Dark Fuchsias.
   Purple Nosegay Geranium.
   Salmon Nosegay ,,
   Scarlet Nosegay ,,
   Pink Cup ,,
5. *Centre*, Brugmansia.
   Variegated Salvias.
   Ageratums.
   Calceolaria amplexicaulis.
6. *Centre*, Scarlet Geranium,—Punch.
   Geranium,—Punch.
   Geranium,—Alma.
7. *Centre*, Cassia corymbosa.
   Jackson's Variegated Geranium.
   Hackness Variegated ,,
   Golden Chain ,,
8. *Centre*, Brugmansia.
   Salvias.
   Ageratums.
   Calceolaria aurantia multiflora.
   ,, aurea floribunda.
9. *Centre*, Scarlet Geranium.
   Geranium,—Perfection.
   ,, Baron Hugel.
10. *Centre*, Dark Fuchsia.
   Calceolaria,—Crimson King.
   ,, angustifolia.
   Verbena,—Purple King.
11. *Centre*, Scarlet Geranium.
   Geranium,—Punch.
   ,, Alma.
12. *Centre*, Light Fuchsia.
   Jackson's Variegated.
   Tall Variegated.
   Old Scarlet Variegated.

2061. Many other single beds could be given, but these are sufficient as examples, as any gardener of ordinary ingenuity will find no difficulty in increasing the number to any extent that he may require. The beds given in the following page are square, and are divided by a stone kerb. Their proper place is in front of the mansion. It will be observed, also, that the mode of furnishing the beds is given at the same time. Each bed is divided into four half-diamonds diagonally.

2062. The plants first named were used for the diagonal lines; the others furnished the small half-diamonds. This group of beds also looks well when each is furnished with one colour only, the centre row of beds being contrasted with the sides. They have also been richly furnished with the best Noisette, Tea, China, and Fancy roses, as well as the best sweet-scented, fancy, and variegated Pelargoniums. They also make a charming spring garden, furnished with Crocuses, Tulips, Violets, Arabis, Alyssum, &c.



South side.

1, 5. Calceolaria, Yellow Prince of Orange, Crimson Unique.
2, 4. Lady Colville Geranium; Old Diadematum Geranium.
3. Excellence Geranium; Triomphe de Liège Heliotrope.
6. Picturatum Geranium; Christine Geranium.
10. Touchstone Geranium; Tom Thumb's Bride Geranium.
7, 9. Rose Superb Geranium; Voltairiana Heliotrope.
8. Purple King Verbena; Aurea floribunda Calceolaria.
11, 15. Golden Chain, Crimson Unique Geranium.
12, 14. Floribunda Geranium; Harkaway.
13. Gazania splendens; Lobelia, light variety.

North side.

1, 5. Calceolaria amplexicaulis, Crimson Unique Geranium.
1, 2, 4. Pink Nosegay Geranium; Rouge et Noir.
3. Excellence Geranium; Triomphe de Liège Heliotrope.
6, 10. Touchstone Geranium; Queen Geranium.
7, 9. Rose Superb Geranium; Heliotrope, Voltairiana.
8. Purple King Verbena; Aurea floribunda Calceolaria.
11, 15. Golden Chain; Crimson Ivy-leaf Geranium.
12, 14. Floribunda Geranium; Baron Hugel.
13. Gazania splendens; Lobelia, a light variety.

2063. The group of beds which is placed at the head of the chapter is looked down upon from about an elevation of two feet: the tall plants in the centres of the beds rise from three to four feet above the surface. These, while beautiful in themselves, serve to diversify the outline, and relieve the monotonous sameness of the garden. The tall plants introduced must, however, be beautiful in themselves, or the result will not be satisfactory; their technical names and prominent position alike assert that they are there to be seen; and unless they will bear *looking at*, they had better be dispensed with. This group of beds was planted as follows in 1860:—

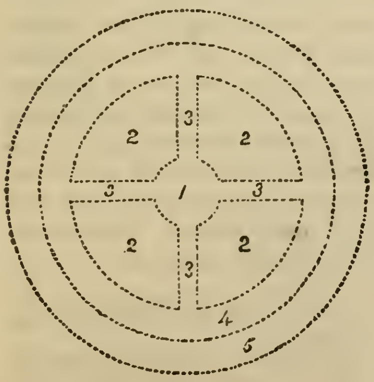
1. *Centre*, Scarlet Geranium, White Petunia; edged with Heliotrope.
2. *Centre*, Fuchsia, Geranium (Tom Thumb); edged with Cineraria maritima.
3. *Centre*, Fuchsia, yellow Calceolaria; edged with Verbena (Purple King).
4. *Centre*, Scarlet Geranium, Pink Nosegay; edged with Golden Chain.
5. *Centre*, Scarlet Geranium, dark Petunia; edged with Œnothera prostrata.
6. *Centre*, Cassia corymbosa, Geranium (Rubens); edged with Flower of the Day.
7. *Centre*, Cassia, Geranium, Cerise (Unique); edged with Mangles' variegated.

The centre plants are standards.

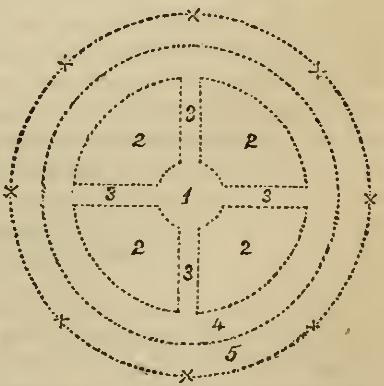
2064. Mere height is not the only qualification. Each *starer* should be as nearly a perfect specimen as possible, challenging a right to its position upon its own merits, and furnishing an example of form, culture, and beauty for its humbler neighbours to emulate and imitate.

2065. *Scare-crows* of plants, with a green twig or two on the top, are not suitable for this purpose. I have sometimes longed for a magical wand to wave all such plants down into one level sea of beauty, which their *waif*-looking visages deformed. Better, infinitely better, dispense with them altogether than use plants which appear as if dragging out a wretched existence on *stilts*. However, good plants skilfully disposed have a charming effect. On very large beds sometimes climbers are used for centres with good results. Tropæolums, convolvuluses, cobæas, maurandyas, clematises, &c., might all or any of them be used for this purpose. The same or any climbing plants are also occasionally used as a trained edging round what are termed basket-beds, with a raised base of wood, iron, brick, or stone, covered with ivy or other creeping plants, and generally having one or two rims bent over at a certain elevation above the bed, to convey the idea of a basket. Of course, the rims or handles are also enwreathed with climbing plants, and the whole have often a most fascinating and graceful appearance. Where they have two handles, the basket might be furnished with four distinct colours,—thus: orange, blue, scarlet, white, dividing the basket transversely. Hence, each quarter of the circle would be a distinct wedge of colour. By the aid of chains, flexible wire, or rope-yarn, what are called tent-beds may be formed. Drive a tall stake of the desired height, say 10 feet high, in the centre; describe a circle with a radius of, say eight feet. Insert six or eight stakes at equal distances on this line, say six feet high; join the centre stake to each side, one with a chain or wire, and the frame of a tent-bed is formed. The following illustrations will exhibit their formation and furnishing:—

2066. These are raised beds about 2½ feet above the ground, and were planted as follows it 1860:—



1. Cassia corymbosa.
2. Geranium,—Alma.
3. Perilla nankinensis.
4. Perilla ,,
5. Tropæolum,—Tom Thumb (yellow).



Two top beds in 1861 were planted with

1. Tall Scarlet Geranium.
2. Golden Chain ,,
3. Purple King ,,
4. Purple King ,,
5. Tropæolum,—TomThumb(scarle

2067. There is also a series of raised beds, about 15 inches high, not far from these, which are planted in bands of three different colours, and have hoops across the top to give them the appearance of baskets.

2068. Basket-beds may also be planted as follows :—Outside edge, Anagallis monella; next, Flower of the Day geranium, divided into four, six, or eight compartments by lines of the same or Bijou geranium, and the panels filled with Calceolaria,—Prince of Orange.

2069. The following is also pretty :—Outside, Tropæolum elegans; next, three rows of Calceolaria aurantia multiflora; centre, a large mass of Purple King verbena.

2070. The most effective beds in the gardens here last year were four of Mangles' geranium edged with the Purple Orach; and four of Ageratum edged with the Flower of the Day geranium. Four large beds of pink Monthly roses, pegged down, mixed with Cerise unique geranium, and edged with variegated Alyssum, were also very much admired.

2071. I have mixed the Mangles' geranium with the Atriplex rubra, or Orach, on the *pincushion* principle, as well as edged it with it this season. The effect is already striking. The old Verbena venosa, dotted amongst Mangles in this way, has a charming effect. Other pincushion beds may be formed by mixing plant for plant, of Dandy geranium and Lobelia speciosa, and Lady Plymouth with Purple King verbena or the old Scarlet verbena Melindres. The Variegated Alyssum or Cerastium, mixed with Lobelia, also makes a soft and chaste pincushion bed. Golden Chain geranium, dotted among white verbenas and edged with Lobelia speciosa, is also beautiful. Mrs. Pollock and Bijou, alternate on a ground of Lobelia or Purple King verbena, would have a rich effect. But enough has been said to enable any and all of your readers to arrange their gardens in accordance with correct principles and the best practice.—D. T. F.

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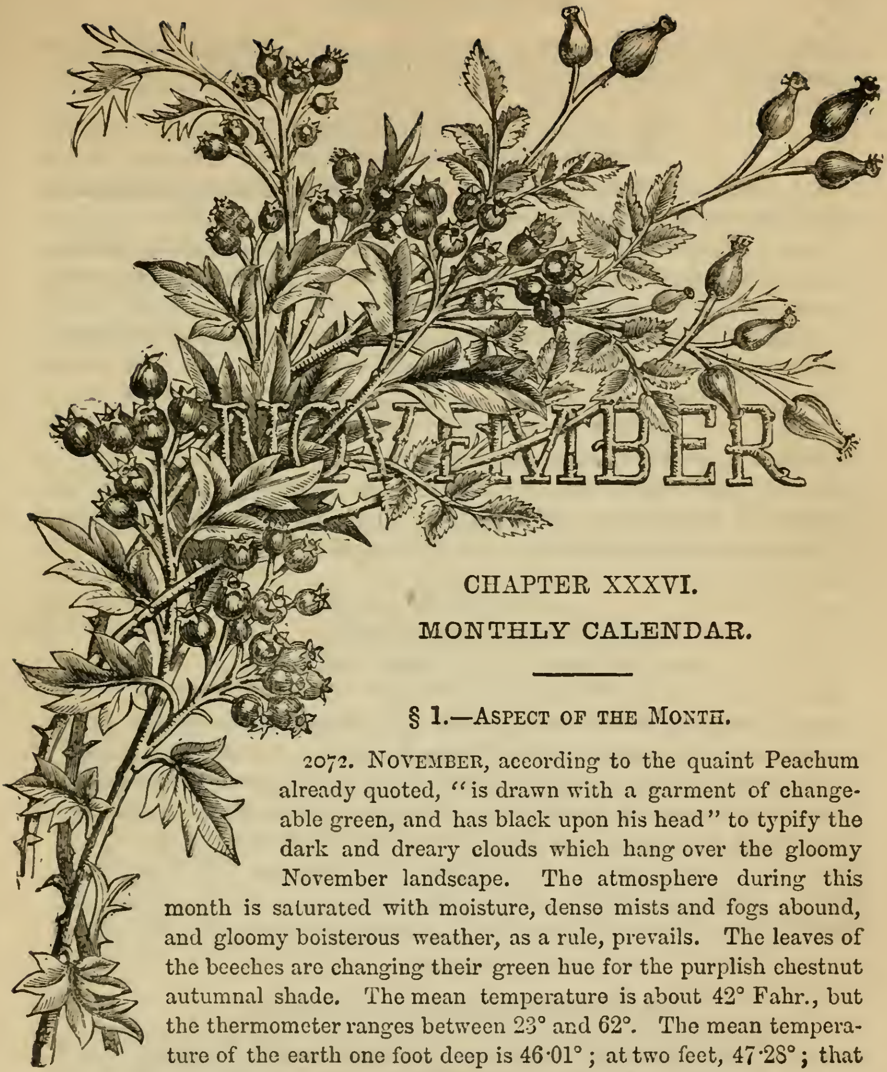


CHAPTER XXXVI.

MONTHLY CALENDAR.

§ 1.—ASPECT OF THE MONTH.

2072. NOVEMBER, according to the quaint Peachum already quoted, "is drawn with a garment of changeable green, and has black upon his head" to typify the dark and dreary clouds which hang over the gloomy November landscape. The atmosphere during this month is saturated with moisture, dense mists and fogs abound, and gloomy boisterous weather, as a rule, prevails. The leaves of the beeches are changing their green hue for the purplish chestnut autumnal shade. The mean temperature is about 42° Fahr., but the thermometer ranges between 23° and 62°. The mean temperature of the earth one foot deep is 46·01°; at two feet, 47·28°; that of the air being 42·98°, on an average of the years 1844 to 1853.

> "In the stormy east wind straining,
> The pale yellow woods are waning,
> The broad stream in its bank complaining,
> Heavily is the low sky raining."

What a roaring there is now in the woods; what a rattling of branches and clashing together of great grey iron boughs that seem to groan again in their mighty agony, as the storm tries to tear them from their gnarled and knotty stems. There is something grand about the great November wind lifting up its mighty voice, and pealing, organ-like, through those ancient cathedrals of nature ; the roaring of the woods and the rattling of branches, and the falling leaves, which are blown into dark and dreary places, are certain harbingers of winter.

> " The wither'd leaves bestrew the garden path,
> Made miry with the fall of fleeting showers."

In the garden a great change has come over the scene ; even the trimmest of lawns has now a desolate and dreary look ; few flowers linger in the beds, and those few seem out of place. But it is not yet entirely bare of flowers ; the many-tinted asters remain, the arbutus-tree is now conspicuous in its beauty, and a few bright chrysanthemums nod their heads here and there ; the brilliant hollyhock still rejoices the eye during the few sunny hours the month affords us, unless frosty weather prevails ;

> " And the blue gentian flower, still in the breeze
> Nods lonely, of its beauteous race the last."

But the lover of flowers must now look indoors for his enjoyments,—to the conservatory and greenhouse, if he is fortunate enough to possess these, for his flowers. In the open air, if aided by a gloomy imagination, the poet's picture may be nearly realized, and the burthen of the song be—

> " No sky—no view—
> No distance looking blue—
> No warmth, no cheerful healthful ease,
> No comfortable feeling in any member—
> No shade—no shine—no butterflies—no bees—
> No fruits—no flowers—no leaves—no buds in November.

2073. Evergreens now become the redeeming element in the shrubbery ; the strong viscid juices which bind their leaves to the stem, yields a varnish which protects them from the effects of cold and damp, giving them a dark and glossy tint in strong contrast to the deciduous trees around them. These trees are now being rapidly denuded of their leaves. First the walnut becomes naked, then the mulberry, the ash, and the horse-chestnut in their turn. Apple and peach trees sometimes remain green till the end of the month ; and trees which have been lopped, as White of Selborne tells us, retain their leaves till a late period.

§ 2.—FLOWER-GARDEN AND SHRUBBERY.

2074. *Flower-Garden.*—The glory of the flower-garden is waning, and it will soon be desolate, in spite of the gardener's care. Meanwhile, keep the beds neat by the timely removal of decaying foliage, and keep the grass and gravel walks clean and smooth by frequent rolling. Plants to be taken up and potted should be attended to immediately, or at least protected during the nights, for fear of sudden frosts. Pelargoniums, calceolarias, and similar plants, are greatly benefitted by being placed in a gentle bottom-heat until the fresh roots break. Now is an excellent time for propagating cuttings of calceolarias and most herbaceous and shrubby plants, if placed in a cold frame. Chinese, Bourbon, and hybrid perpetual roses, will now root freely under the same treatment.

2075. When the beds are cleared, trench them up; manure and add new soil where necessary, and plant the bulbs for spring flowering. Hardy annuals sown last month, if large enough, may be transplanted at once to their permanent beds, with pansies, alyssums, phloxes, primulas, and other herbaceous plants from the reserve-garden.

2076. Where alterations are contemplated, they should be determined on without delay, and proceeded with when the plans are thoroughly matured,—not before. To render the grouping system permanently interesting, occasional changes, both in form and arrangement of beds, are necessary; and a retrospective glance, with a view to future arrangements, will be useful now, while the whole effect is fresh in the memory, and when next year's bloom is about to be provided for. In the selection of plants, it is to be borne in mind that duration of flowering should be the first consideration, for few gardens will afford the time or the cost necessary to carry out the plan of a changeable flower-garden, in which the beds are decorated in early spring with scillas, bulbocodiums, erythroniums, hepaticas, sanguinarias, and other precocious flowers, to be succeeded by autumn-sown annuals, in masses, in the summer months, and autumnal bulbs, dahlias, hollyhocks, and chrysanthemums, bringing us again to the verge of winter. This system of gardening, however attractive when attended with high keeping, is too costly and entails more trouble than proprietors of the ordinary run of gardens will incur; therefore the gardener must have an eye to the means as well as to the end, and arrange his plans accordingly. In the survey recommended, he will probably remember that, in proportion as the prevailing colours were warm or cold,—that is, scarlet or purple,—so was the distance which separated the beds apparently diminished or increased. "Warm colours," according to Mr. Caie, "like light, irradiate the atmosphere to a greater distance with their peculiar hues; of some colours, as those of the verbena called Hamlet and Campanula carpatica, it may be said that subdued light is the condition in which they are seen to the greatest advantage, since they become really beautiful as the sun passes the horizon." If the distribution of colour has engaged the attention of the cultivator, many expedients will probably occur to him by which the angularity, which is now the distinguishing feature of the flower-beds, may be rectified. Erythronium Dens canis, Allium Moly, Anemone apennina, Sanguinaria canadensis, Scilla italica, Phlox verna, and a vast number of other hardy plants introduced now, will add interest to the flower-garden by-and-by.

2077. Now is the best time to collect leaves from lawns and drives, and to stack them in some out of the way place for use. Oak and beech are the most valuable to the gardener, affording the most durable heat. Tread them firmly in the stack, and afterwards thatch them to keep them dry; the remainder may be thrown together for rotting, when they form a valuable auxiliary for potting and composts. The principal lawns should be swept when leaves are numerous, as well as to remove worm-casts, &c. An occasional rolling will keep the surface in good order.

2078. The stock of cuttings should be looked over, and additional heat applied, when the roots are not fully formed. Late geranium-cuttings may be removed to the kerbs of the pine-pits, which will assist them to make roots. In storing the stock away for the winter, endeavour to keep all those plants together which require similar treatment. Some kinds will stand more damp than others, and may be wintered in common frames; but the better kinds of bedding-out geraniums, and some other tender things, will require a moderately dry house or pit. To preserve verbenas, petunias, &c., properly through the winter, they must be kept dry to prevent mildew, to which they are very liable in frames during wet weather. As it is desirable to protect the recently-struck plants from rains, and yet to give them a large portion of air, the sashes must be daily tilted up back and front, to cause a complete circulation. Where room can be found for the bedding stuff in empty vineries, they should be allowed to remain there as long as possible, as in dull weather they become better established than when kept in frames, more especially those only recently rooted.

2079. The herbaceous ground will now require a thorough cleaning, cutting down the stalks of plants done blooming, and seeing to the support of the few things still in flower, as the Michaelmas daisies, and rake and hoe the borders neatly.

2080. During this month the flower-beds should be enriched with manure or fresh loam, and the soil turned up before frost sets in; the edges of beds in grass should be gone over with the edging-iron to preserve the form. All flowering plants standing in pots or frames should be fully exposed to the sun on every favourable occasion, so as to harden their tissues; and all growing plants, like the verbenas, stopped back to secure a bushy habit by-and-by. Most of the verbenas may be kept in a cold pit, dusting a little slacked lime over the soil in the pots or boxes; applying the same treatment to the shrubby calceolarias. Pot-up and cut back the dwarf lobelias and Œnothera prostrata, sprinkling a little silver-sand among the roots. Lophospermums, maurandyas, and the tropæolums, require a dry and airy situation in the frame or greenhouse when taken in doors.

2081. *Rose-Garden.*—Planting and transplanting are now the chief employment; if very dry during the month, give a good watering to each plant before the soil is fully filled in. Stocks should also be collected and planted for budding on next season. The true dog-rose makes the best stock, and may be distinguished from sweet-brier by the large white thorns which thickly cover the stem of the latter towards the base; and from those of climbing habit, by the dark green colour of their bark and weakness in their stem. Prune the old roots close to the stem, cutting all strong shoots close off. When planted, some growers say cut the head down to within four or six inches of the height at which they are wanted, and, having levelled the soil, leave them till spring. The best growers prefer leaving the head full until the plant is thoroughly rooted.

2082. *Shrubberies* should now be thinned out, and other alterations completed, and the formation and repair of new shrubberies brought to a close during the month. For the purpose of renovation the necessity of a reserve-garden cannot be too strongly urged. Most herbaceous plants blossom incomparably finer from young plants propagated betimes than from old and exhausted ones, such as we see generally in the pleasure-grounds. With a reserve-garden in which the best shrubs are coming forward, alterations are easily made: where overgrown branches have to be cut back and thinned, the operation must be performed gradually, and a portion headed down every season until the whole is renovated and covered with young foliage. When headed down and in a proper state of luxuriance, keep it so. Nothing looks worse than a mass of rambling overgrown shrubs, with large heads and a confused array of naked ugly stems.

2083. Among the shrubby flowering-plants one only meets with in the best gardens, but which might be cultivated everywhere, we may mention the magnolias; they are natives of North America, China, and Japan; have a noble foliage and wonderfully beautiful flowers, and some of them a powerful and most agreeable fragrance. They flourish well in a compost of good loam, peat, and decomposed leaves. The grandifloras, all three American, are perfectly hardy, flourishing luxuriantly in the open border even when exposed to cold and cutting winds. No garden should be without them.

2084. *Aralia japonica* is another splendid shrub from Japan, of rich foliage, and throwing out numerous expanded clusters of bloom of whitish-green colour, each cluster being composed of several spikes of bloom 18 inches long, diverging from a common centre: it requires a sheltered spot in the garden, however. The spiræas are another highly ornamental family of shrubs, some of them adapted for rock-work, as *S. prunifolia;* others for planting behind smaller shrubs, when the long spikes of bloom bend gracefully forwards, like *S. Lindleyana;* others of the genus are dwarf shrubs of good habit, and bloom in rich spikes both of white and pink flowers, in great abundance.

2085. *Florists' Flowers.*—At this season of the year the amateur cannot do better than get together those soils, &c., which are indispensable for the proper growth of his favourite flowers. Where there is an opportunity of so doing, turf, pared two inches thick from a loamy pasture or a green-lane side, stacked together to decompose, will be the foundation of his composts. A large heap of melon-bed manure should also be secured, not forgetting as large a quantity of fallen leaves as possible. A cartload of sharp river-sand is an indispensable adjunct, and the florist should look out for willow-dust and decayed and rotten sticks. A quantity of excellent food for plants may be scraped out from hedge-bottoms. Allow auriculas to have abundance of air, but little or no moisture: the plants being in a state of rest, require but little. Tulips now out of the ground suffer every day.

2086. *Auriculas* are now in their winter quarters; they require abundant air, and occasional inspection to see that no worms are in the pots; the indications being castings on the surface; if such appear, water them with lime-water, or remove them by repotting.

2087. *Carnations and Picotees,* layered in previous months, should now be potted off, and placed in their winter quarters, protection from dampness being the chief consideration: in fine weather let them be fully exposed. *Pinks,* planted last month, only require to see that the winds do not loosen them.

2088. *Dahlias* are still fresh and gay, if the weather has been tolerably mild; but should frost appear, no time should be lost in taking them up, storing them away carefully labelled, stalks downwards, in some place where they can be secured from damp. Seedlings that have bloomed late, and weak plants, are benefitted by being potted and kept dry through the winter.

2089. *Hollyhocks.*—Cut down and propagate from the old stools, and by eyes from the flowering stems, as formerly directed, but without forcing.

2090. *Pansies* should now be potted off as reserves for filling up vacancies, for new beds in the early spring: the beds should be examined to see that the worms have not attacked them.

2091. *Polyanthuses* in beds will be benefitted if the surface of the soil is stirred, and a top-dressing of equal parts maiden loam, leaf-mould, and well-decomposed cow-dung, applied.

2092. *Tulips,* not yet planted, should be got in without delay, taking care, however, that the soil is not wet; hooped over, and matting prepared against rainy weather.

§ 3.—THE KITCHEN-GARDEN.

2093. Approaching winter bids vegetation prepare for a rest. In the kitchen-garden the crops will make little progress for the four months following this. During that time will be apparent the amount of forethought displayed in summer and autumn cropping. If a fair amount of Brussels sprouts, savoys, and other winter vegetables, have been provided, this is the main point; and supposing herbs, salading, and minor crops, have been attended to, then, if any ground is unoccupied, lay it up in ridges, having trenched it or dug it deeply, supposing the ground to be light. I have an objection to laying heavy soil in ridges, except for certain purposes,—as for sowing peas, beans, &c., as described on a former occasion. For planting early potatoes, the advantages of ridging are great; but heavy clayey ground does not pulverize easily: the action of frost is wanted on the surface. Of course the thicker the surface acted upon the better. In digging heavy ground, give the men to understand that they must lay the soil in solid spits as they are cut out with the spade: the spits should not be broken, but laid roughly together, with plenty of openings for the air and frost to act on them. Ground managed in this way I have found easier to crop in the spring time than that which has laid in ridges, because, when the ridges are levelled, a new surface is turned up, and the pulverized surface is buried. Ground ridges this month, therefore, should be levelled again in February, and another surface exposed and pulverized. At this time it is very necessary to give attention to the state of the drainage: unless surplus water gets away readily, great inconveniences may result. Heavy rains may make the garden a swamp, and spoil the crops already put in, besides preventing others being sown or planted.

2094. The state of the ground, upon all occasions where imperfect drainage exists, renders it soft and slimy to the feet, and difficult to cultivate.

2095. *Asparagus,* if not already done, should be cut down, and the beds receive a dressing of very rotten dung, which may be forked in or not; it signifies but little, as its fertilizing qualities will be washed into the ground during the winter, and the rest will be so pulverized as to fork in all the easier in March; but previous to manuring, all weeds should either be removed, or completely covered by the dressing. If it is intended to make new beds, no better time can be chosen than the present for trenching the ground. If done now, the new surface will be exposed to atmospheric influences the whole winter long, and, if frequently turned, will be in fine condition for planting the following April.

2096. *Artichokes.*—A good mulching of leaves will be of considerable benefit to these in protecting the crowns from the frost. Let the ends of the leaves be exposed, and let them be killed. If a good cordon of leaves grows round the collar of each, they will stand better and come in earlier.

2097. *Seakale.*—As the leaves decay and detach themselves, they may be removed; but, unless pots and hot dung are soon to be applied, it is not necessary to remove them; in fact, I have some doubts as to the propriety of doing so.

2098. *Beans.*—On light ground and sunny borders, these may be put in without fear of failure. Without such advantages, autumn-sowing of them is not to be generally recommended; the true purpose of it is to have crops a trifle earlier than they would be by deferring the sowing till February; but the loss during the winter counterbalances the advantages in other respects, and sowing now may be left to those who have plenty of room.

2099. *Runner-Beans.*—Pull up these, as they will produce nothing more this season; the haum may be pulled off the sticks; or, if all pulled up together, the leaves will soon drop off and the haum dry, when all may be chopped up together for firewood, or tied in faggots, and may be kept for many useful purposes. Some burn them out of the way at once.

2100. *Peas,* like beans, may be sown now, and with the same proviso as to the nature of the ground. I have known crops lost during damp winters, and would not recommend autumn-sowing to those who have not an abundance of room. Early sorts are, of course, best for sowing now.

2101. *Celery.*—It is advisable to give the final earthing-up during this month: it grows much slower after this month, and must be allowed time to blanch. Besides, should severe frost set in, it might be injured by exposure. Even that grown merely for soups, &c., had better receive a little earthing for protection; and if dusted with lime to destroy slugs, before earthing, so much the better.

2102. *Cardoons.*—Treat in a similar manner.

2103. *Beet.*—Get this crop housed or pitted during this month; it will not stand frost without injury. Cut off the leaves without injury to the root, and let them lay a couple of days to heal or callow; then stow them where they will not mould or damp, but can be protected from frost.

2104. *Carrots.*—Treat in a similar manner to beet. It is advisable to get them housed before there is any danger of very severe frost. Young crops to stand the winter should be carefully thinned and hoed between.

2105. *Onions.*—The autumn-sown should be treated in a similar manner.

2106. *Leeks* ought to be earthed up, if not done before, when they can be taken up as wanted: they will continue to grow in mild weather.

2107. *Parsnips* are as well left in the ground till wanted.

2108. *Potatoes,* if any are left in the ground till now, should be taken up without delay, and stored, although I have known them keep well in the ground by taking up every other row, and placing an additional layer of earth over each ridge.

2109. *Turnips* should be hoed and kept clean.

2110. *Scorzoneras,* &c., are best left in the ground till wanted.

2111. *Lettuce,* if tied up for blanching, should be kept dry if possible, or they will soon rot. The advantage of good cabbaging sorts will be apparent at this time. Some may yet be planted out to stand the winter.

2112. *Endive.*—Continue to blanch in succession. If this is done with flowerpots, these, as they are removed, can be placed on others.

2113. *Spinach.*—If this has been properly thinned and kept clean, it will continue to grow, the leaves alone being picked for use. If the plants stand nine inches or a foot apart, it will be all the better.

2114. *Broccoli.*—Such as are coming in now should be watched. There is a time to cut them, which is ascertained by so doing. Remove dead leaves, and use the hoe between them.

2115. *Brussels Sprouts, Borecole,* and *Savoys,* are best kept free from dead leaves, which in damp weather become unpleasant.

2116. *Cabbage* may still be planted out for the next summer's crop; but the earlier it is done now the better. Use the hoe freely amongt those planted last month: they will be much better for it.

2117. *Cauliflowers.*—Stir the soil about those in hand-glasses, and keep the lights off unless frost compels keeping them on.

§ 4.—FRUIT-GARDEN.

2118. Let the bulk of kitchen and dessert apples in the fruit-room be often looked over to remove decaying fruit. In doing this, be careful not to bruise the others, which would induce early decay. Clear off the remaining leaves from wall-trees; and now that the greater part of the fruit-tree leaves have fallen, the whole should be cleared off the ground preparatory to pruning and turning up the borders rough for winter. Figs against walls should have any odd remaining fruit taken off. Thin out superfluous shoots, and pinch out the points of the wood selected for bearing, when the branches should be tied together and matted, or protected by haybands, fern, &c., for the winter.

2119. Towards the end of the month is the best time to commence pruning dwarf apples and pears. Define in your mind what particular form the young tree should assume when at its full size, whether pyramidal, globular, or spreading. Shoots to form the skeleton of the tree should next be selected. How far these require shortening will depend on their strength and the object wished for. The remaining shoots must then be cut back so as to fill up the figure. Orchard-trees, where covered with lichens and mosses, should have them scraped off, and a wash of hot lime and water applied to the branches. Apples, pears, plums, and cherries, may be taken in the order in which they are named. Remove all the old shreds where they are used; those that will do another season should be boiled to destroy the eggs of insects before using them again. The large wood looks better neatly tied in with osier twigs. Before tying or nailing, examine the trees, and if infested with scale or other insects, dress them with soft soap dissolved in hot water, to which add sulphur, quick-lime, and tobacco-water; mix the ingredients well together, which should be of a consistency to adhere to the branches; with this dress the branches, but not during frost.

2120. Apricots, peaches, nectarines, and vines, may be left till February or March, taking apricots first, in consequence of their being the first to open the flower. Young plantations of strawberries should have some short dung spread between the rows, to preserve their yet shallow roots from frosts, which otherwise might lift them out of the ground. Look the beds over, and head the ground firmly round the plants. This is more necessary where the soil is light and rich, as the frost will make such ground more porous.

2121. *Plums and Cherries* should all be gathered before the frost sets in, and either wrapped in paper or hung by the stalk in the fruit-room. Pruning should follow.

2122. *Currants and Gooseberries.*—Plant and prune both while the weather is favourable. For the production of large gooseberries, short pruning is necessary. Where quantity is required, and the trees are young, shorten the young shoots one-half or two-thirds. If the trees are of full growth, only take the points off the young shoots, and when the branches are thinned out, cut back to a bud on the upper side of the shoots. When the trees are pruned, lime the ground, and, if necessary, add manure and dig it slightly.

2123. *Strawberries.*—Continue as last month, unless inclined to adopt an expedient which has sometimes produced enormous crops: it is, to take up the old plants in spits and plant them again immediately in the same ground. The reason for this, or for its results, does not appear, unless it is analogous to the root-pruning of dwarf trees recommended by Mr. Rivers.

§ 5.—CULTURE OF FLOWERS UNDER GLASS.

2124. When the driving ice-sleet batters against the window, enwrapping snow-wreaths darken the roofs of our glass-houses, and all external vegetation is enfolded in the drowsiness of November fogs, then our foresight, cultural skill, and inventive genius, have their reward in creating a scene of almost summer beauty. Under such adverse circumstances, the transition from the external to the internal world—from out of doors to under glass—is no less grateful than the contrast is striking. There is the darkest gloom of winter; here is the cheerfulness of summer. There is the leaden grey of dreary mist, and the bare outlines of bald trees; here is a genial atmosphere, and colours vying with the rainbow in brilliance and beauty. Outside, the air seems a mixture of soot, dust, and water, and is loaded with the stench of decaying leaves and other vegetable matter; inside we revel in the perfumes of mignonette, roses, heliotropes, and perhaps winter-flowering carnations. The difference between the outside and in being now so great, the less communication there is between them during the month the better. During the continuance of *characteristic* November weather, every glass-house should be looked upon and managed as a huge Wardian case, whose first and primary use, under such circumstances, is to keep *November outside,* while *we,* the proprietors, are enabled to enjoy spring, summer, or autumn, at our pleasure, *inside.* It is the height of stupidity and folly to allow a November fog to inundate a conservatory under the pretence of *giving air.* Such air is as little wanted by the plants as by those who come there to enjoy them, and is equally inimical to the health and well-being of all concerned. This is emphatically the *dead season.* Plants under glass, though in the best possible health, would rather sleep just now than grow; and if a dry atmosphere and rather a low temperature is maintained, houses may be kept shut up close for a fortnight or three weeks together, not only with perfect impunity, but with positive benefit to the plants; but this supposes that the external atmosphere is ungenial. This, however, is not always the case. Embrace every opportunity of admitting the external air to conservatories and greenhouses when it is of a temperature of 45°; also change the air of stoves, &c., during the few hours of sunshine that often come to chase away even a November fog. In fine, the more fresh air the better, provided it be warm and genial;—the less the better when it is otherwise. Plants will live and thrive for weeks in the same atmosphere, when adverse circumstances render a change dangerous, and they will bear this treatment better now than during any other season of the year; and yet, as a general rule, the more fresh air the better.

2125. As the quantity of external air admitted may now be safely reduced to its minimum, so may also be the quantity of water. The fact is, the power of a plant to use water to any good purpose chiefly depends upon the intensity of light and heat to which it is exposed. When these agencies exert their maximum power, water is profusely evaporated,—when they are weak, as now, evaporation and elaboration are both slowly performed. Even a plant in vigorous growth requires comparatively little water now, while those at *rest* need scarcely any. It is of the utmost consequence also, that what is necessary should be applied only where it is wanted.

2126. In watering thirsty roots, see that the flowers and succulent leaves are kept dry. This is a point of considerable importance at almost any season; at this, it is a question of life or death to many plants. Chinese primroses, for instance, double or single, will speedily fog off and perish if the needful water is poured into the centre, or permitted to trickle down wet leaves to the same vulnerable point,—no less the centre of beauty than the seat of danger. Other plants suffer in the same mannner, although few, perhaps, to the same extent. The water given to plants should always be 5° or 10° higher than the house in which they grow. Never water a plant until it is dry, and then water thoroughly. Regulate the quantity given by the state of growth and drinking capabilities of each plant. A chrysanthemum coming into flower will require three times the quantity as a camellia in the same state. In one word, it is absolutely necessary that consummate skill and intelligent reflection should determine the *destination* of the watering-pot instead of that hydra-headed, plant-killing monster—*water to-day to save the trouble to-morrow*—blind, unthinking, destructive routine.

2127. *Conservatory.*—How beautiful it is all a-blaze with chrysanthemums, scarlet salvias, geraniums, Chinese primroses, &c., and fragrant with the Frenchman's darling giant mignonette. How beautifully chaste, and enchantingly refreshing those few fern and begonia leaves are, contrasted with all this richness of colour. See how those white and light-coloured chrysanthemums are brought out by these Salvia splendens, and the golden yellow heightened by those ageratums? Yes, I see; but the charm consists in the arrangement; and the best of it all is, that *it is charming*, and that it is made so by means that industry and sobriety bring within the reach of all. A year's self-denial of beer and tobacco might build a conservatory—the ornamental adjunct of every imdustrious artisan's home—and enable him to purchase this work into the bargain, to instruct him how to keep it so all the year round.

2128. This is pre-eminently the month when a conservatory is most needed. When utter desolation reigns without, there is the more need for enthroning the goddess of beauty within. This is comparatively easy even with the aid of the few plants I have named. Chrysanthemums alone make a brilliant display. November is the reigning season of this Chinese belle. If not so refined as some, it is the most strikingly effective of all; even camellias pale their beauty in their presence. Its cheapness, readiness of increase, and simplicity of culture, also bring it within the reach of the poorest. The choice of selection is well-nigh endless, and they have latterly been divided into Large, Pompone, and Anemone-flowered varieties. The following are good sorts, that cannot fail to give satisfaction. Those marked thus * are the most expensive; but they can, with a few exceptions, be supplied by most nurserymen at 6*s.*, 9*s.*, 12*s.*, and 18*s.* per dozen. Now is also just the time to purchase them, when they are in bloom; and then you can please yourself both in colour, substance, shape, and size of flower, as well as in the habit of the plant,—a point of the first moment if they are intended for pot-culture:—

Large-flowering Varieties.

Alfred Salter,—fine form; light pink; first rate.
Annie Salter,—fine golden yellow.
Aimée Ferière,—white, tipped rose-pink; incurved; fine.
Adriane,—cream, buff-tinted.
Aurora,—very full; ochre-yellow.
* Bacchus,—rosy fawn; large; incurved.
Beauté du Nord,—violet-carmine.
Boadicea,—creamy rose.
Cassy,—orange and rose.
Chevalier Domage,—fine gold.
Cloth of Gold,—fine; large.
Defiance,—fine; incurved; white.
* Dido,—white sulphur; incurved; dwarf habit.
* Draco,—incurved; dark red; free bloomer.
Dragon,—puce; light centre.
Etoile Polaire,—deep yellow; incurved.
Excelsior,—bright crimson; very full.
* Finstriatum,—primrose; fringed.
Formosum,—finely incurved; pale sulphur.
Golden Christine,—golden buff; large.
Golden Queen of England,—canary; fine.
* Guelder Rose,—pure white; finely incurved.
* Imbricata alba,—incurved; white.
King,—light peach; incurved.
La Reine d'Or,—golden yellow; fine.
* Lady St. Clair,—pure white; finely incurved.
Le Prophète,—golden fawn; a splendid flower.
Lord of the Isles,—creamy yellow and orange.
Marceau,—rose; bordered white.
Novelty,—large; blush.
Picturatum roseum,—salmon; incurved.
Prince Albert,—bright crimson.
Queen of England,—fine blush; incurved.
Queen of Lilacs,—fine; incurved.
Queen of the Isles,—white; large.
* Snowball,—fine white.
* Snowflake,—very dwarf.
Versailles Defiance,—rose and lilac; fine form.
Vesta,—ivory-white; one of the oldest and best.
Vulcan,—bright red crimson.

Pompone Varieties.

2129. These are beautiful for front shelves in conservatories, or beds or borders out of doors; generally of compact, close growth, and the flowers about the size of three large daisies, and rivalling the large ones in colour; they are at once the neatest and most ornamental plants for furnishing:—

Adonis,—rose and white.
Aigle d'Or,—canary-yellow.
* Apollo,—fine; incurved; chestnut-yellow.
Bob,—fine dark brown.
Brilliant,—crimson-scarlet.
Christina,—canary-yellow; brown tips.
Diana,—white; fine form.
* Fairy,—light lemon.
Fennella,—bright orange.
Hendersonii,—yellow; early-flowering.
Ida,—pale clear yellow.
* Indian Prince,—carmine-red and gold; incurved.
* Lucinda,—rosy lilac and blush; full.
Madame Fould,—cream; one of the best.
Madame Mielly,—violet-amaranth.
Marabout,—white-fringed; fine.
Mrs. Salford,—white; fine.
Mrs. Modell,—fine white.
Nemesis,—bronzed orange.
President Ducaisne,—rosy carmine; scarlet.
Queen of Lilliput,—rosy blush.
Sacramento,—golden yellow.
Scarlet Germ,—crimson-scarlet.
Stella,—light-shaded pink.
The Little Pet,—blush-white; incurved.

Large Anemone-flowered Varieties.

2130. I do not think these equal to the others in beauty. They differ from them in having a centre of close petals almost like a sunflowers, till more like an anemone, and a fringe of loose petals for an edging. Almost every one knows the Golden Orange-coloured Gluck, and it is a perfect representative of this class :—

George Sands,—red, with gold centre.
Fleur de Marie,—large white.
Juno,—white.
King of Anemones,—crimson.
*Lady Margaret,—pure white; with row of ground petals.
Margaret of Norway,—red and gold.
Margaret of Versailles,—blush.
Louis Bonamy,—lilac; high centre.

Pompone Anemone-flowered Varieties :—

Reine des Anemones,—fine white.
Perle,—rose; lilac centre.
President Morel,—cinnamon; gold centre.
M. Astre,—golden yellow.
Madame Peuter,—pure white.
Golden Cedo Nulli,—golden canary.
Cedo Nulli,—white, with brown spots.
Boule de Neige,—pure white.
Ariane Amaranth,—gold centre; fine.

2131. Supposing that plants are bought in now, and allowed to flower in the conservatory, they may be removed to a cold frame or sheltered corner, out of doors, until the end of March or beginning of April. If the latter position is chosen, the pots must be plunged to the rims in cinder-ashes, and the tops slightly protected with some dry litter. In looking them over at the time specified, three obvious modes of increase present themselves. The old stools may be divided, they may be planted out as they are in rich soil with a view to layering, or cuttings may be taken off them, and the plants either planted out in the shrubbery or entirely discarded. If division is determined upon, pieces, with a single, or two or three stems, may be chosen, and either planted out into rich soil or potted. If the latter, they should be placed into a close frame for a week to start them, and gradually used to light and air until they are placed in a sheltered situation out of doors. When they have grown three inches, stop them, to induce compact growth, if nice plants are your object; but if you grow blooms for exhibition only, never stop them at all. Concentrate the whole strength of the plant into two or three stems, and the strength of these stems into a single bud at the top, and that bud cannot fail to be a prodigious flower. For conservatory plants, however, two or three stoppings will be necessary, and the flowers, if not so fine, will be ten times more numerous; and the leaves will, or ought to touch the rims of the pots. As soon as the first pot is full of roots, the plants should be shifted into another, or placed in their blooming-pots at once: no soil is better for them than equal parts well-decomposed cow-dung, loam, and leaf-mould, liberally coloured with bone-dust and sharp sand. Neither should there be much drainage, as the roots will speedily occupy the whole mass of earth, and almost prevent the possibility of stagnation. From first to last the plants should never flag, and be constantly fed with rich clear manure-water.

2132. In training, the fewer stakes that are used the better, and towards the end of October the plants should be moved under glass. This is a critical change for them, and unless the leaves are kept well syringed two or three times a day for a few weeks, the chances are they will either discolour or fall off.

2133. Pompones, or others to bloom in beds or against walls, may receive the same general treatment in training and watering, &c. It is also a common practice with many to plant out their entire stock, and take up and pot what they require in the beginning of October. This plan succeeds well if the leaves do not wither, as the result of the check of potting.

2134. Where layering is determined upon, the stools are planted out in rich soil, and the branches layered into pots about the beginning of July. Very nice plants with splendid foliage may be procured in this manner.

2135. But *cuttings* is the favourite mode of increase by the best cultivators. No plant, unless it be couch-grass, strikes so easily as the chrysanthemum. In any soil, at any season, put a growing branch in any place where it does not freeze nor scorch, and it is almost sure to root. Nearly all growers differ as to the best time for striking these plants. Some cultivators recommend November; some succeed admirably by inserting them in May. I have long compromised matters between the two extremes by striking mine in March. They are then potted off in April; shifted into 48's on the 1st of May. Continued in a temperature of 50° for a fortnight; headed and hardened off, and stood out of doors by the end of May, and receive their final shift a month or six weeks later. By this mode I have never failed to have a good bloom and presentable plants, both essential for conservatory purposes.

2136. *Plant-Stove.*—Here the Poinsettia pulcherrima, Euphorbia jacquiniflora, Begonia nitida, Gesneria cinmabrina, will be lighting up by their dazzling grandeur and enlivening beauty, masses of ferns, palms, and variegated plants. Late caladiums must now be watered with great care, as the bulbs are impatient of damp during winter. Those beginning to go off must have scarcely any water, and as soon as the leaves are matured, it should be entirely withheld, and the pots turned on their sides for the winter. Remove every dead leaf and flower as soon as they appear; water in the morning for the next three months; keep a temperature of 65°; frequently change the arrangement of the plants, and only admit air in fine weather.

2137. *Greenhouses* occupied by heaths, azaleas, &c., not in flower, must be kept cool, dry, and clean. They may also have more air than the conservatory, and a temperature of 40° will suffice.

2138. *Camellias.*—Where these have a house devoted to them, they require careful management now. The buds will just be swelling, and a sudden change of temperature, a scarcity or excess of water, or a cutting draught of cold air, will often cause the buds to drop. Be extremely careful not to give an excess of fire-heat when it becomes necessary, and maintain a genial growing atmosphere of 45°.

2139. *Pelargoniums.*—The same temperature will suit these during the month. If worms make their appearance in the pots, water three or four times in succession with *clear lime-water*. The repetition is necessary to insure their destruction, as these pests seem to have the power of casting their skins when injured, and so escape. But as they cannot carry on this evasive system indefinitely, a few repetitions of the lime will effectually destroy them. Remove every dead leaf; thin out and train the shoots; shift late-flowering plants into their blooming-pots; keep pansies at the warmest end of the house, and give fire-heat enough to drive out damp and enable you to change the atmosphere during mild days or gleams of sunshine.

2140. *Orchids.*—See that they are clean, kept in a temperature of 65°, kept dryish, and let them sleep.—D. T. F.

§ 6.—Forcing Pits and Frames.

2141. *Cinerarias and Calceolarias.*—Remove dead leaves (but there ought never to be any on these plants); shift into larger pots; pot off and prick out late seedlings; water forward plants with clear manure-water; and smoke with tobacco as soon as a single aphis appears.

2142. Where the chief stock of budding plants is kept in pits, they will require frequent looking over, to guard against damp, careful watering, proper protection from frost, and all the air that the external atmosphere will permit of.

2143. *Forcing-Pits.*—Introduce a few more kalmias, azaleas, rhododendrons, roses, sweet-briers, violets, &c.; also, the first batch of the earliest-potted hyacinths, narcissus, and other bulbs, if the pots are full of roots, otherwise leave them another week or two plunged in old tan in a cold pit, the best of all positions for them while they are rooting. Nothing can well be easier than the culture of these bulbs. The best soil for them is equal parts turfy loam and well-rotted cow or horse-manure, at least two years old, with a sixth part sharp gritty sand. But they will grow in almost any soil, or indeed without soil at all, in damp moss, cocoanut-fibre refuse, water, or sand. The great point is to choose good, firm, well-ripened, rather than *large* bulbs, although, of course, the larger the better if they are also well-ripened, and to pot or start them early. Then, by keeping the tops in darkness, and the roots, if possible, a little warmer than the tops, get the roots as much in advance of the *stem* as possible. If the pot or glass is once full of roots, while the stem is only starting into growth, a good bloom, with ordinary care, is almost certain. In this condition they may be removed to a forcing-pit, with a temperature of 55°, to a conservatory shelf, pinery, or peach-house at work, or a sitting-room or kitchen window, with almost entire certainty of success.

2144. A single bulb in a 48-sized pot, or one in the centre, or three round the sides of a 32- or 24-sized pot, look well. Drain the pots well; fill them with the compost, placing some of the richest and roughest lumps over the bottom, and place the bulb on the top, slightly pressing it into the soil. Some recommend a handful of sharp sand to be placed under the bulb to insure thorough drainage. If the compost is dry, water after planting; if it is in a proper medium state of moisture, this will not be necessary. If water is used, leave the pots for a day or two, to partially dry; then place them in a cold pit, plunged in and covered over the top three inches deep with old tan, cinder-ashes, or leaf-mould: leave them there until they are rooted; then move them to a forcing-pit, or anywhere in the light and moderate warmth to bring them into flower. They must never suffer for the want of, nor have an excess of water, and may have clear manure-water alternately with clean, if they are placed where the smell would not be offensive. If grown in the windows of living-rooms, they should be placed on the table at night to guard against excessive cold, and also be moved out of the draught when the room is aired. Various ornamental supports are advertised for holding up the flowers in lieu of stakes. In pot-culture, stakes are often unnecessary; for glasses, some support is generally indispensable. Tye's are the neatest and most efficient I have seen. Hyacinths in glasses of water require the same general treatment. One of the chief points is to see that the base of the bulb does not *rest in* the water; if it does, the chances are that it will decay before roots are emitted. The water should be changed daily at a temperature of 55°. Sometimes a dozen of bulbs are arranged in a flat glass dish, containing half an inch or so of water, which is speedily occupied with a tangled web of roots: this, as well as placing the bulbs in damp moss in ornamental baskets, affords excellent facilities for tasteful arrangement. The three striking colours, red, white, and blue (we have few good yellows), might be placed in very pleasing and effective contrast, and a bright golden band of glowing yellow crocuses makes a matchless finish to the whole. I decidedly prefer growing hyacinths in masses of colour, and they contrast well with narcissus, tulips, snowdrops, and especially crocuses. In fact, the whole of these bulbs may be grown in juxtaposition to each other in ornamental vases or baskets, and be infinitely more effective than single pots of either dotted about here and there on conservatory shelves. Any vessel, pot, or pan, may also be filled with damp sand for hyacinths, to be kept damp; and if occasionally watered with manure, they will do as well in it as in any soil whatever. The fact is, the hyacinth is not primarily dependent for its health or beauty on the food or culture we impart: it laid the foundation of both in the rich soil and beneath the warm skies of the plodding Dutchman; and if we will only give it a modicum of light, air, water, and warmth, it hastens to unfold its rich beauty, and diffuse its satisfying fragrance for our gratification and delight. Procure your bulbs as early as possible in October, and pot or place in damp moss, water, &c., or in the open ground, at once. The following are first-rate varieties, equally adapted for any or all of the above modes of culture:—

Double Yellow.

Bouquet d'Orange.
Jaune Suprême.
Heroine.
La Grandeur.

Single Yellow.

Anna Carolina.
Rhinoceros.
Heroine.
La Pluie d'Or.

Double White.

Anna Maria.
Bouquet Royal.
Latour d'Auvergne.
Prince of Waterloo.
La Virginette.
Virgo.
A la mode.
Grand Monarque de France.
Sceptre d'Or.
Triomphe Blondina.
Pyrène.
Don gratuit.

Single White.

Albion.
Alba maxima.
Florence Nightingale.
Grandeur à Merveille.
Grande Vidette.
Impératrice Romaine.
Crown Prince of Netherlands.
Lady Havelock.
Mammoth.
Mont Blanc.
Queen Victoria.
Seraphine.

Double Blue.

Prince of Saxe-Weimar.
Prince Frederick.
Lord Wellington.
Louis Philippe.
Rembrandt.
Morillo.
L'Important.
Laurens Koster.
Garrick.
A la mode.
Bloxberg.
Comte de St. Priest.

Single Blue.

Argus.
Baron van Tuyll.
Charles Dickens.
Grand Blue.
Grand Lilac.
King of Siam.
Nimrod.
Prince Albert.
Regulus.
William the First.
Uncle Tom.
Robinson.

Double Red.

Alida Catherina.
Bouquet Royal.
Bouquet Tendre.
Duke of Wellington.
Frederick the Great.
Grootvorsts.
Lieutenant Waghorn.
Panorama.
Princess Royal.
Queen Victoria.
Waterloo.
Sir Walter Scott.

Single Red.

Beauty.
Cavaignac.
Cosmos.
Firchall.
Lord Wellington.
L'Ornement de la Nature.
Madame Hodson.
Norma.
Tubiflora.
Tempel van Apollo.
Sultan's Favorite.
Prosper Alpini.

2145. What the pompone is to the large chrysanthemum the miniature hyacinths are to the ordinary ones. Every child should have a dozen for its special amusement and delight; and they are equally adapted for all the purposes to which the ordinary hyacinth is used. Twelve miniature hyacinths may be bought for 4*s.* 6*d.*, and the following dozen should be purchased at once:—

Albert,—deep pink.
Alfred,—blue.
Alice,—red.
Charlotte,—white; violet centre.
Henry,—dark blue.
Isabella,—rose, shaded pink.
Jessie,—pure white.
Lucy,—pink.
Neillie,—violet.
Theodore,—bright red.
Mary,—deep blue.
Willie,—brilliant carmine.

2146. The price of the bulbs here specified varies from 6*d.* to 5*s.* each; but by the dozen they could be purchased for 18*s.* Other named sorts can be purchased from 6*s.* a dozen upwards. Where large quantities are required for bedding or between borders, mixed sorts of each colour can be had from 2*s.* 6*d.* to 3*s.* per dozen, or a guinea a hundred.

2147. *Polyanthus and Narcissus.*—These rank only second to the hyacinth for decorative purposes, and totally eclipse it in richness of perfume. They require similar culture to the hyacinths, and will flower in water, sand, moss, &c., but do best in soil. The Double Roman is the earliest, and may easily be had in flower at Christmas if potted in September. The following good varieties can be purchased from 4*d.* to 9*d.* each, or from 3*s.* to 8*s.* per dozen; or mixed at 2*s.* 6*d.* per dozen, or 10*s.* per hundred:—

Bazelman Major,—white, with orange cup.
Florence Nightingale,—white, with yellow cup.
Grand Monarque,—white, with pale-yellow cup; very large.
Grand Prince,—white, with citron cup.
Louis le Grand,—pure white; extra good.
Queen Victoria,—white, with orange cup; early.
Soleil d'Or,—yellow, with orange cup.
Yellow Prince,—yellow; orange cup.

2148. Jonquils are also beautiful, and effective if half a dozen or a dozen are planted in a single pot; otherwise they are too insignificant. The beautiful large double and single sweet-scented can be bought from 1*s.* to 3*s.* a dozen: culture the same as the narcissus. Tulips in pots require similar treatment to hyacinths. The earliest are the single and double Van Thols; but any of the early single varieties will force. Generally, however, only the double ones are much used for this purpose. Perhaps the following are as effective as any:—

Rex Rubrorum,—crimson.
Imperator ditto,—crimson.
Regina ditto,—crimson.
Tournesol,—yellow and red, variegatum yellow.
Duke of York,—bronze-crimson.
Gloria Solis,—yellow and red.
La Candeur,—pure white.
Extrémité d'Or,—crimson, bordered with orange.
Purple Crown,—purple.
Blue Flag,—violet.
Crown Imperial,—white and crimson.

2149. For growing in pots, pans, or baskets, few bulbs can equal crocuses. The pots must be thoroughly drained, as an excess of water is certain destruction to these bulbs: any light soil will do to grow them in. They can also be grown in moss, damp sand, &c., and their general management may be the same as for hyacinths. They are rather impatient of heat, or a close, confined atmosphere, and can seldom be got to flower well before the middle or end of January. A list of good sorts will be found at page 179: any or all of these will do for pot-culture, either as edgings to pots, vases, or baskets of hyacinths, narcissus, or tulips, or, arranged in contrasting masses by themselves, they are at once the brightest and happiest-looking harbingers of spring.

2150. *Snowdrops.*—These must not be overlooked. The best way to succeed with them in pots is to take up patches entire out of the garden, place them in pots, and bring them forward on a warm shelf or with a very *gentle bottom-heat.* Accustomed to the companionship of the biting blast and the cold snow, they will not endure much heat; but gentle, patient treatment will generally be rewarded by the unfolding of their spotless tiny bells that ring the knell of the departed year, and announce the coming of a joyous spring. Yes, the meek, gentle snowdrop comes to us in the dark days of winter, like Morn in the white wake of the morning star, comes furrowing all the orient with the golden beams of hope. **D. T. F.**

§ 7.—Fruit-Culture under Glass.

2151. One of the chief duties here is fruit-preservation. This is just the very worst month in the whole year for keeping ripe fruit of any kind, and especially trying for ripe grapes; one speck of decay or mildew will soon become a thousand under the influence of a November fog. Houses of ripe fruit must therefore be examined daily, and every specked berry or decayed leaf removed. Brisk fires must also be lighted in the morning, to enable you to give air both at front and back, to agitate the atmosphere and expel damp. No plant must, on any account, be placed in the house, nor a drop of water be allowed to fall on paths, &c.; neither must the house be shut up close until the heating apparatus is cold.

2152. An increase of temperature in the absence of a current of air is most injurious to ripe grapes, and causes them to decay almost sooner than anything; unless during very cold weather, a current of air should always be maintained through vineries containing ripe grapes. Better that the grapes should be slightly shrivelled than that they should be altogether decomposed. In fact, the toughness of rind induced in the process of shrivelling is one of the surest preservatives against decomposition. If the houses are not waterproof, or plants must be placed in them, the best plan will be to cut and store the grapes as recommended last month.

2153. Another great point in keeping late grapes, is to keep the rain off the borders in which the roots are growing. This is sometimes effected by thatching with straw, sometimes by the use of boarding or tarpauling, and often by spreading a layer of concrete, formed by mixing six parts of coarse gravel to one of quick-lime over the surface of the border. If the border has a pitch of three or more inches from back to front, and this concrete is put on about three inches thick, it will furnish a cheap and efficient waterproof covering: it may be removed in the spring or not, at the option of the cultivator. The best grapes I have ever grown were produced from vines in a border thus covered for three whole years. During that entire period they were never watered, and never showed any symptoms of needing it: the surface of the concrete in summer was sometimes so hot one could scarcely touch it. It never cracked with the sun's rays, however, and early in October it was always covered with strawy litter, to prevent the dispersion of that heat which its absorptive powers had husbanded in the border.

2154. After taking care of the grapes that we have, let us look after those that are to come. The vinery started last month will now be breaking, and a genial temperature of 50° to 55° must be maintained. This should not be exceeded during this month: the absence of the sun renders rapid growth now dangerous. What is gained in rapidity will be lost in solidity and strength. If the sun should shine, however, an increase of 10° or 15° will do no harm, but much good. See that the heat of the outside borders is kept regular, avoiding all extremes: it may continue 3° in excess of the inside temperature. If maintained by the aid of dung and leaves, frequent examinations and turnings will be necessary to keep it right; sometimes fermenting material is also used to aid other means of keeping up the internal temperature. It makes a good deal of extra labour, but has the great merit of both feeding and warming at the same time. Where it is used, it must be partially sweetened before it is introduced, as too much rank ammonia would prove destructive to the tender foliage of the vines. When this is properly attended to, perhaps no food is so grateful to, nor so speedily available for the vines as this. I have sometimes, when turning this material beneath healthy vines (and it should be turned twice at least in the day), thought that the leaves revelled in the food, and vibrated with delight.

2155. *Vines* in pots may be started in a bottom-heat of 53° in dung-beds, unless means are found for giving them bottom-heat over flues, &c., in the houses in which they are to be fruited. After they are fairly broke, they can be carefully moved to their fruiting quarters; in many places the first vinery will now be started. Proceed as recommended last month.

2156. *Peaches.*—If these are wanted next May, the house, or trees in pots, must now be started. They should already have been untied, pruned, washed, &c. Examine the borders thoroughly; water, and top-dress with good maiden loam, if necessary. See that the house, as well as the trees, is scrupulously clean, so that you do not have to battle with vermin as well as dark skies and inclement weather for the next six months. The Royal George, Noblesse, Galande, and Vanguard peach, and the Red Roman and Violette Hâtive nectarine, are the best for early forcing. Proceed slowly; give no fire unless compelled, and do not exceed 45° by fire-heat during the month.

2157. *Orchard-Houses.*—If these are either open or unroofed, see that the hungry birds do not destroy your next year's crop. They seem fond of model standard trees, and in a single day will often mar the hopes of a twelvemonth. The lights should also be placed on these structures, as it is a dangerous practice to allow standard trees to be much frozen. The cold is also much more intense here than on the surface of a south or west wall.

2158. Neither should fig-trees grown under glass be ever frozen. The embryo fruit will most likely be destroyed, and a whole month's or six weeks' forcing lost in consequence. This is a good time to examine the wood thoroughly for scale, &c., and to paint them all over with the composition I have already recommended for vines.

2159. *Pines.*—Those swelling off must be assisted by a warm genial atmosphere of 75°, and be watered when necessary. The bottom-heat will require to be examined, and fermenting material renewed possibly. Plants intended to fruit next spring and summer must be guarded against any sudden check, be kept rather dry, and *rest* for the next three months in a temperature of 60° to 65°.

2160. Similar treatment, except the *resting*, will suit the general stock of succession plants. They must be kept slowly moving in a dryish atmosphere.

2161. Much attention will be necessary to renewing linings, &c., to those in pits, to maintain the requisite temperature. Coverings of mats, reed-frames, &c., must also be applied in severe weather, and all sudden changes guarded against. Occasionally, too, some of the strongest succession plants will require water at the roots, although the air may be a great deal too damp. (See last month about how to apply it.) This is the most trying month in the whole year for pine-plants in pits; hence they must receive extra care and attention. In fact, the month makes war with all culture of fruits as well as flowers; and he who would bear up bravely and succeed in spite of November fogs, has now to remember Shakspeare's precept against ill-fortune:—

> "You were used
> To say, extremity was the trier of spirits;
> That common chances common men could bear,
> That, when the sea was calm, all boats alike
> Show'd mastership in floating. But Fortune's blows,
> When most struck home, being gently warded, crave
> A noble cunning."

D. T. F.

§ 8.—Hotbed and Frame Cultivation.

2162. Cucumbers and melons will require the same treatment as that recommended in January. Heat is most necessary, and, to a certain degree, the more the better: in some families they are wanted all the year round. This, of course, necessitates the culture of them at this time of the year as well as any other; and although the difficulty is greater, in proportion to the shortening days and colder air, still they can be grown, and in some cases must be grown. Let the young gardener remember that the main secret in growing them is a steady moist heat that never falls below 70°, and is better kept up to 80°, and may advantageously be elevated to 90° in the daytime. They must receive no chill; so long as the roots work kindly, and the leaves revel in a sweet moist heat, they will do well. It is needless to repeat directions that have already been given in full; but this much more may be said, the causes of success or failure should be observed and remembered; it is only by so doing that proficiency is to be attained. The best cultivators will affirm that they have had many failures; but failure has given no discouragement, but rather afforded a stimulus to increased effort till success has rewarded their pains.

2163. *Cold Frames.*—I have observed that the plants in these are often treated as if they were more tender than they really are. The object is not so much to stimulate them into growth, but to protect them from such injury from frost and storms as they would be exposed to in the open air. Corn salad, endive, lettuce, cauliflower, parsley, carrots, radishes, onions, and many more light crops, are not so tender but that they will stand out of doors; but then they keep so much better and fresher under the protection of frames, that it is well worth while to have a few lights devoted to them. They also begin to grow rather earlier in the spring, and continue growing later in the autumn, than they would do if quite exposed; but it should be strictly observed not to keep them in any way close, so as to breed mould. If any mouldiness accrue, it is a sure sign that they are kept too close. Let the plants have full exposure as much as possible, just as if the plants were growing out of doors, with just the aid of the lights to protect them in case of sharp frosts, heavy rains, snow, fog, or winds, should they be more than ordinary. Water should be given rather carefully. Avoid giving enough to chill the roots; a medium state, rather approaching dryness, is better than the least overwetting, especally in frosty weather.

2164. Seeds of radishes, lettuce, and small salading, may be sown any time during the month, or any time in the winter. They will germinate slowly, but may come in very useful in the spring; the latter will be ready in about a month. In frosty weather the protection of a mat will, in addition to the lights, be sufficient protection for most of these things; but if they become frozen, do not expose them too suddenly.

2165. Garden-frames are very useful for protecting other plants than those above named. Many plants, as pinks and pansies, stocks and chrysanthemums, and indeed many plants generally accounted hardy, when planted in the borders, will, when in pots, require the protection of a frame, or, if planted in a bed of soil placed within the frame, they will flower earlier and stronger.

2166. The treatment for violets has been given in full,—that of most dwarf plants is very similar; it is therefore unnecessary to repeat what has been already said; but I have often kept bulbs in cold frames, and found the plan answer admirably. If spring-flowering bulbs are potted and placed close together in the frames, and covered with about four inches of light soil or old tan, and left so till February, they may then be uncovered and exposed to the light: they will then begin to grow and flower admirably. When plunged in this way, they need not be uncovered until the time stated; indeed, I have known them flower best if not uncovered till they grow through the covering.

§ 9.—WINDOW-GARDENING.

2167. Window-plants now require to be carefully managed as regards exposing them to the open air, and should be adapted to the time of the year. Those who have evergreens for winter, besides flowering-plants for the summer, can manage to have the outside sills always furnished; a few of the former will be found very useful, as they are easily managed, and may be placed in the north aspect in the summer, and brought forward in the winter. The best probably are small plants of conifers; that is, pines, cedars, and cypresses: these always look neat, and may be kept small; but other evergreens may also do very well. Aucubas, boxes, and others,—above all, lauristinus, in dwarf bushy plants, are invaluable; but then, when standing on a window-sill, the pots containing the roots should not be exposed to frost. It is a mistake to suppose they can stand it without injury: no plants can do so to keep them in health. During the winter they must be taken inside on frosty nights, or plunged in moss or some such material.

2168. Indoor plants should receive all the light that can be given them: the circumstances of their position, the short days, &c., tend to diminish it; it should not be diminished by placing the plants further from the glass than can be helped. In watering, also, a little more caution must be exercised.

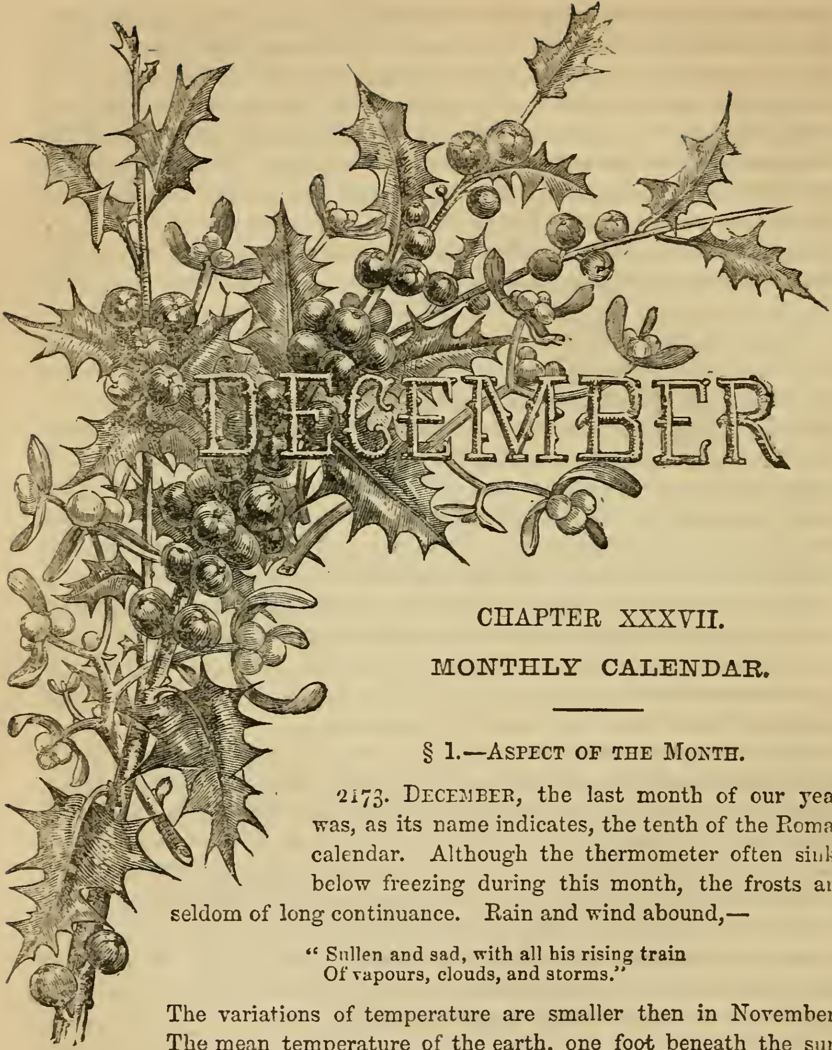
Plants are less able to appropriate it now than in warmer weather; it is therefore more likely to stagnate. Examine the drainage, and see that it is sufficient to carry off all surplus water, and allow no dead leaves to mould and disfigure the plants. Plants having ornamental foliage will be found very useful; they furnish a variety sufficient to satisfy all tastes and conveniences, and many of them are very suitable for window-culture. *Farfugium grande* has been already mentioned: it does well in a mixture of peat, loam, and sand, and will always carry a good foliage under ordinary management.

2169. *Centaurea gymnocarpa* is a white silvery-leaved plant, which, when properly grown, assumes a palm-like habit, and always looks well. *C. ragusina* is another sort of equal merit. *Cineraria maritima,* otherwise known as Dusty Bob, is somewhat similar, and is often grown as a window-plant. These and some others of like character will bear the ordinary temperature of the season, and require no more than the mere protection of a dwelling-room. Those who possess a plant-case like that invented by Miss Maling can ascend still higher, and add Caladiums, some of which are very beautiful. Tradescantias, dracænas, begonias, &c., may receive a place, and will be found exceedingly ornamental. Many orchidous plants of singular habit may also be suspended within the case, and will have an admirable effect, as those can testify who have seen these cases exhibited at the horticultural shows.

2170. There are again many plants valued for their peculiar scent. Numerous species of geranium possess a very agreeable scent; several sorts of diormas, the lemon-scented verbenas (*Aloysia citriodora*), balm of Gilead (*Dracocephalum canariense*), may be grown as window-plants requiring no particular treatment beyond what can be given in a window.

2171. Some plants, again, are valued for the scent of the flowers. Among these, gardenias stand conspicuous. The best is easily grown as a window-plant. *Magnolia fuscata* is beautifully scented when in flower, and is a handsome plant when not in bloom. Those who value plants for this quality should have a good supply of hyacinths and narcissus to flower in March and April. It is not too late to get them, provided it is done early in the month.

2172. Chrysanthemums will now be in bloom. In order to make them last as long as possible, let them not be kept close or damp; give plenty of fresh air; water with weak liquid manure. Let them have a little sun morning and afternoon, but not enough to make them flag.



DECEMBER

CHAPTER XXXVII.

MONTHLY CALENDAR.

§ 1.—ASPECT OF THE MONTH.

2173. DECEMBER, the last month of our year was, as its name indicates, the tenth of the Roman calendar. Although the thermometer often sinks below freezing during this month, the frosts are seldom of long continuance. Rain and wind abound,—

> "Sullen and sad, with all his rising train
> Of vapours, clouds, and storms."

The variations of temperature are smaller then in November. The mean temperature of the earth, one foot beneath the surface, is now 41·13°; at two feet, 42·83°; that of the atmosphere being 38·14°.

2174. December gives unmistakable signs of winter; the last lingering leaf has fallen from the beech and oak, and it will occasion no surprise if one rise some morning to find an unvaried expanse of snow overspreading the earth. Nevertheless, a few flowers still linger in the garden; the delicate and fragrant Chinese rose still blooms, if not so rich in hue or powerful in odour as at midsummer, the absence of other flowers renders them highly valuable. The star-like anemone, too, sometimes enlivens the December border, as does the lauristinus with its clusters of half-opened flowers; and in the shrubbery the arbutus presents the singular appearance of ruddy strawberry-like fruit on the same branch with delicate trusses of white flowers; and the well-known clematis, the "traviler's joie" of old Gerard, "decketh and adorneth waies and hedges where people travell, which is also termed Virgin's Bower, by reason of the goodly shadowe which it maketh with its thick bushing and climbing, and Old Man's Beard from the hoary appearance of the seeds, which remain long on the hedges." To these we may add the ivy and holly, with its bright red berries, and the mistletoe, and the Christmas rose, which assists at the Christmas garland; but wonderful is the change a few weeks have made,—

> "My very heart faints, and my whole soul grieves
> At the moist, rich smell of the rotting leaves.
> And the breath
> Of the fading edges of box beneath, and the year's last rose
> Heavily hangs the broad sunflower
> Over its grave; the earth so chilly;
> Heavily hangs the hollyhock,
> Heavily hangs the tiger-lily."

§ 2.—FLOWER-GARDEN AND SHRUBBERY.

2175. Many amateurs are tempted to desert their gardens until brighter prospects and more genial weather tempt them forth to their usual labours; whilst nothing more liberally rewards proper attention—nothing exacts a severer penalty for neglect—than a garden. Those who would pay successful homage at the shrine of floral beauty must emulate the chivalrous old knights in self-denying continuous devotion. A week's cold indifference or studied neglect may counteract the labours of years, and render nugatory most of our future efforts to regain the smile of beauty. It should never be forgotten that gardening differs from most pursuits in this—that it has to do with life; and whether vegetable life is sensitive or not, it resents everything like indignity, or neglect, with as much determination and energy (if not so passionately or suddenly) as if it were. Earth, air, and water;—these, with the addition of heat, constitute the raw material out of which the flowers weave their beauty, the fruit its rich aroma and delicious flavour. Not only the pure air and water, but both so impure as to be totally destructive to animal life, are absorbed by plants and transformed by their vital and chemical forces into colours of inimitable beauty, and sweet odours. Materials of similar chemical and physical qualities are moulded into every conceivable variety of shape, and tinted with all the colours of the rainbow. Leaves of one uniform texture throughout, are variegated, either regularly or capriciously, with red, white, yellow, or green. Whether colour is a quality of bodies, or one particular part of leaf or flower is endowed with the marvellous power of reflecting back only one particular coloured ray of light, the mystery is alike great and past finding out.

2176. Such sentiments as these impart a peculiar relish and sacredness to gardening pursuits, and tend to enrich and strengthen our own spiritual and moral nature while we are engaged in beautifying the earth. They also help to sustain and interest, when cold winter has swept all beauty out of sight with his withering breaths, and give to our winter work almost equal charms to that possessed by our summer labours of love and pleasure. In many respects the former is even of more importance than the latter. It is only those who dig, plough, and sow in winter, that have any right to reap in summer or autumn.

2177. Now is the time to plan and lay the foundation for the future beauty. Half the gardens in the country are miserable failures, either because they have no design, or because it is so stupidly confused or obscure as not to be perceptible. A garden without obvious design imprinted on its surface is like a house with neither shape or foundation. Fortunately such an abortion of a house is impossible, and unfortunately such gardens are not only possible but common. A few trees, shrubs, and plants, dotted about as if they had come down from the heavens on the tail of a water-spout; some ugly, capricious lumps of soil, called clumps, beds, or shrubbery; a little of everything everywhere, and masses of nothing nowhere, and the garden is finished. Now, I wish to burn it deep into every mind, that what the sculptor is to a block of marble, the gardener of correct, orderly, systematic, refined taste is to a garden. It would just be as truthful to erect a rough block that had only received a few rude blows with the hammer, and term it a masterpiece of sculptural art, as to dignify many of the abortions that disfigure natural scenery with the names of gardens and pleasure-grounds.

2178. It is the imprint of *mind* that imparts the chief charm to *matter*. Intellect, spirit, genius, leap from the block and the canvas, and enchain us by their fascinating charms. They should also rise up to meet us from every good garden, and consummate our enjoyment. Having got the ground into the proper shape, for which directions have already been given, see that it is also made of the best quality. Some instructions for doing this have already appeared in this work. Good, properly-prepared soil is of the first importance in the kitchen-garden; it is even of greater importance here. The permanent nature of the plants introduced into shrubberies and flower-gardens renders the future improvement of bad soil difficult, and well-nigh impossible. All who value rapid, healthy growth must see that everything possible is done to ameliorate the soil before planting. November is the best month in the whole year for planting; and presuming that this operation is still going on, I will now give some instructions how and what to plant. And, first, large trees and shrubs. To gain time, these are largely used in many places. The effect of ten or twenty years' growth is gained on any given spot at once. This is of immense importance in the lifetime of a man, and the practice of transplanting large trees is therefore popular and highly to be commended; neither is there much risk of failure with proper caution and skill, and it is not so expensive as many imagine. With the aid of McGlashin's patent transplanting machines, trees of almost any size may be safely and expeditiously removed: in fact, these machines forcibly remove earth and roots, and all, with the minimum risk of failure; but I have moved my large trees and shrubs, 30 feet high and 20 in diameter of top, with no other machinery than a few strong planks nailed on a harrow sledge. In this mode of transplanting, a trench is dug round the plant at a distance from the bole of two-thirds the diameter of the top, and to a depth of two to five feet, according to the age and size of the tree, character of the soil, depth of roots, &c., leaving a space of from two to three feet at the back of the tree untouched. At the same time, the front, or part where the tree is intended to come out, should be approached at an easy angle of inclination, extending from two to three feet beyond the circumference of the trench already begun. The earth is rapidly removed from the trench; the roots carefully preserved as you proceed. The size of the ball in the centre must be determined by the nature of the soil and size of the plant. Its mere size is of less consequence than the preservation of the roots as the removal of the earth proceeds.

2179. A fork must be used to separate the roots from the soil, and they should be carefully bent back and covered over until the work is finished. After excavating from one to three feet beyond the line of the bole of the tree or shrub, according to its size, introduce into the vacant space a sledge or low truck; cut through the solid part at the back line, and the tree will rest on the machine. This should be furnished with four rings at the corners, through which ropes or cords should be fastened and firmly fixed to the bole of the tree. Of course some soft substance, such as hay or moss, will be introduced between the bole and the cords, to prevent them chafing the bark. The tree is then ready for removal; the necessary horse or manual power can be applied; the plant will slide gently up the inclined plane, and may be conveyed any distance desired with facility. Sometimes it may be impossible to fix the cord through the back rings until the tree is out of the hole. In that, and indeed in any case, cords had better be attached to the top, and carefully held by men, lest a too strong vibration of the top should upset the machine, or topple the tree over. Arrived at its destination, the hole, if the tree is large, will be found to have an inclined plane on each side to enable the horses to walk through. When the ball arrives towards the centre of the hole, the horses stop. If the tree is not too heavy, the truck or sledge is prised up by manual strength, and the plant gradually slid off. If very heavy, a strong chain is passed under the ball, attached to a couple of strong crowbars; the horses are applied to the other end of the truck, and the tree drops off into its place. The roots are carefully undone, and spread throughout the whole mass of soil as the process of filling up goes on; three strong posts are driven in to form a triangle, and rails securely fixed to them across the ball to keep it immovable, the top reduced there and then in mathematical proportion to the mutilation the roots may have suffered; the whole thoroughly drenched and puddled in with water, and covered over with four inches of litter to ward off cold and drought, and the operation is complete. If this operation is well performed, the loss will not average more than from five to eight per cent. The principle involved in all planting is the same, and only of secondary importance to securing as many healthy roots as possible. I place the stability or immovability of both root and top afterwards. When it is otherwise, every breeze that blows is analogous to a fresh removal. No sooner do the roots grasp hold of the soil than they are forcibly wrenched out of it again, and the plant lives, if at all, as if by miracle. The planting of young trees and small shrubs is so simple as scarcely to require instructions. Always make the hole considerably larger than the space required by the roots, whether few or many, so that they may find soft recently-moved soil to grow in; and yet the soil must not be left too loose. If so moist as not to need watering, which will moisten and also consolidate the soil, it may be gently trodden down round the roots.

2180. In reference to the proper distance at which shrubs should be planted, much depends upon the object in view. A safe rule, however, is to plant thick, and thin quickly; from three to four feet is a good average for small shrubs and trees. In three years, two out of three plants should be removed; and in planting it is well to introduce rapid-growing common things amongst choice plants, to *nurse them up;* only the nursing must not continue too long, nor the nurses permanently establish themselves to the injury of the children. This is too often the case, and nearly every shrubbery I have seen has suffered more or less to a ruinous extent from this cause. But if the mere operation and distance of planting is important, the mode of arrangement is still more so. Nothing can well be more unsatisfactory than the present style, which may be called the doting system. Perhaps a dozen varieties of shrubs are planted haphazard all over an acre or two of ground. The only principle kept in view is that, strong or weak, they shall be planted at intervals of the same distance. The result is a dreary monotonous maze of tiresome sameness. Whatever the form or extent of shrubbery, lay it down as a first principle that it shall be planted in distinct groups, and in masses of shrubs or trees. Single plants, at such distances as to allow them fully to develop their characteristics, are desirable as specimens, and as a necessary and pleasing accompaniment of the gardenesque style; but a shrubbery should be a mass of shrubs, not a congeries of single specimens, however perfect; far less must it be a higgledy-piggledy patch of imperfect plants. Plant every thing in groups. Is your shrubbery of serpentine form?—Let every separate sweep, as far as practicable, have its specific furnishing. Put variegated holly in that prominence, berberries in that recess; green yew here, golden yonder; Portugal laurel in this, the next box; beyond them, common laurel, rhododendrons, arbutuses, junipers, kalmias, azaleas, and heaths, all in their turn; the same with deciduous shrubs, which might generally be introduced behind the evergreens; lilacs here, deutzias there;—philadelphuses, spiræas, ribes, and laburnums,—all in groups.

2181. Is your shrubbery straight?—Plant a ribbon border of shrubs, thus: dwarf laburnums, tall standard lilacs, white syringas or deutzias, yews, variegated hollies, box, dwarf golden yews, rhododendrons; and, next to the turf, ericas, or dwarf varieties of *Juniperus sabina*. This, and many other arrangements, would look well; only keep the principle of grouping or massing the different sorts together. The same principle applies to trees. The regular pinetum and arboretum have of late years blinded us to the fact that trees, as well as shrubs and flowers, are most effective in masses. Grandeur is frittered away in the attempt to grow single pretty trees. As an extreme illustration of my meaning, look at a single Scotch fir,—how poor the effect. Look at a forest or a clump of them,—how rich and magnificent. To bring out the individual beauties of every tree is a laudable object, and is the chief object of pinetums and arboretums; but it is wretched taste to sacrifice the grand effect of masses for the sake of growing single specimens.

2182. Unless, therefore, in the smallest places, plant all hardy trees in groups or masses by themselves. The different groups can be so arranged, in reference to each other, as to heighten the peculiar characteristics of each. Even in the massing of pines alone, there is scope for considerable judgment and the exercise of great taste; and their relation to other species of deciduous trees may very much make or mar the beauty of all concerned; but it is now time to proceed to answer the question—What am I to plant?

2183. First, in the pinetum, if space permits, plant every pine that will endure our climate. If space is limited, and economy to be studied, the following will probably suit:—

	FEET.	
Araucaria imbricata	50 to	100
Abies Smithiana	50	—
,, Douglasii	100	180
,, canadensis	30	50
,, nigra	60	70
Cedrus Libanus	30	100
,, deodara	50	100
,, ,, robusta		
Cryptomera japonica		
,, Lobii	30	40
Cupressus sempervirens (the common cypress)	30	40
,, horizontalis	30	40
,, lusitanica	15	20
,, torulosa	15	20
,, McNabiana	6	10
Fitzroya patagonica		
Juniperus compressa		
,, pendula	5	—
,, canadensis	1	2
,, communis	3	10
,, virginiana (the red cedar)	30	40
,, Sabina (the savin)	2	4
,, foliis variegatis		
,, prostrata		
,, recurva	5	10
,, excelsa	20	30
Larix europæa (common larch)	80	100
,, pendula	15	20
Picea pectinata (silver fir)	80	100
,, cephalonica	50	60
,, Pinsapo	30	60
,, Nordmanniana	80	90
,, picta	10	—
Picea grandis	100 to	—
,, nobilis	80	100
Pinus sylvestris (the Scotch fir)	60	80
,, Pumilio	10	20
,, austriaca	60	80
,, Pinaster	40	60
,, Pinea (the Stone pine)	15	30
,, ponderosa	50	100
,, Sabiniana	40	100
,, insignis	30	40
,, radiata	30	50
,, Cembra	30	50
,, Strobus (Weymouth pine)	50	80
,, Lambertiana	100	—
,, excelsa	90	100
,, Hendersonia	40	50
,, macrophylla	30	50
,, Sequoia sempervirens		
,, Wellingtonia gigantea	300	—
Taxodium distichum (the deciduous cypress)	30	70
,, pendula	20	—
Thuja occidentalis (the American arbor vitæ)	20	30
,, siberica	20	30
,, orientalis (the Chinese arbor vitæ)	13	20
,, filiformis	10	15
Cephalotaxus Fortunii		
Taxus baccata (the common yew)	20	30
,, elegantissima		
,, canadensis	3	5
,, erecta	13	—

2184. The distance of these trees from each other must be determined by their height, which has been given here for that purpose. None for permanent effect should be planted nearer to each other than three times their estimated height. This will afford breathing-room, and give facilities for seeing them. If the ground can be thrown into rough and uneven ridges, it will show them to most advantage. Nothing can well look worse than the common practice of placing each tree on the top of a little mound, raised on level ground for that purpose. The tree looks as if it were keeping sentry over a miniature potato-heap. The different classes should be planted in groups, both for the sake of effect and to suit their varying heights; spruces, larches, Scotch firs, junipers, cedars, each having their own compartment in the pinetum. An arboretum is simply an extension of this idea, including all known hardy trees. The same principles, in reference to distance, grouping, &c., will also be applicable here. As sometimes the whole of the ground in either is not moved previous to planting, very large holes will be necessary to secure the well-being of the trees;—from 8 to 10 feet in diameter, and from 3 to 4 feet deep, will not be too much for a Wellingtonia. If the soil can be well trenched, mixed, and returned into the hole two or three months before planting, so much the better.

2185. The following trees may either be planted singly in the arboretum or in ornamental groups at the back of shrubberies, or in parks or pleasure-grounds:—

Partial or entire Evergreens.

	FEET.	
Arbutus Unedo	10 to	20
,, ruber	10	20
,, hybrida	10	20
,, laurifolia	8	10
Quercus fulhamensis	50	100
,, latifolia	30	100
Quercus Lucombeana crispa	30 to	100
,, Ilex (evergreen oak)	40	80
,, latifolia	20	—
,, variegata	20	—
,, Suber (cork-tree)	20	30

Deciduous Trees.

	FEET.	
Acacia Julibrissin	20 to	—
Acer platanoides (the Norway maple)	40	70
,, Pseudo-platanus (the sycamore)	30	60
,, albo variegatum	30	50
,, rubrum	30	50
Æsculus Hippocastanum (the horse-chestnut)	30	70
,, ,, flore pleno	30	40
,, rubicunda	20	30
,, rosea	20	30
Ailanthus glandulosa	60	—
Alnus glutinosa (common alder)	30	60
,, laciniata	30	60
,, cordifolia	30	60
Amygdalus (the almond)		
,, communis amara	20	—
,, dulcis	20	30
,, orientalis	8	10
Betula alba (common birch)	50 to	60
,, pendula	50	60
,, excelsa	60	70
Carpinus Betulus (common hornbeam)	30	60
,, americana	15	30
Castanea vesca (the Spanish chestnut)	30	70
,, asplenifolia	40	50
,, variegata	40	50
Cavya (the hickory)		
,, tomentosa	50	60
,, porcina	60	80
Catalpa syringifolia	20	30
Celtis occidentalis	40	50
Cerasus sylvestris flore pleno	20	30
,, semperflorens (the All Saints' cherry)	20	—
,, Padus (the bird-cherry)	12	40
Corylus Avellana (the common hazel, and varieties)	20	—

	FEET.	
Cratægus coccinea	15 to	20
„ pyrifolia	15	30
„ Crus-galli	15	20
„ splendens	15	20
„ nigra	15	20
„ apiifolia	10	20
„ oxyacantha (the common hawthorn)	12	30
„ multiplex	10	20
„ rosea	10	20
„ „ flore pleno		
„ præcox (the Glastonbury thorn)	10	20
Cytisus albus	7	—
„ Laburnum	20	—
„ alpinus (the Scotch laburnum)	20	30
„ odoratus	40	—
„ Waterer's hybrid	20	—
Euonymus europæus	10	20
Fagus sylvatica (the common beech)	60	100
„ purpurea	50	80
„ foliis variegatis	40	50
„ latifolia	40	50
Juglans nigra	50	60
„ regia (the common walnut)	30	60
Liquidambar Styraciflua	30	50
„ imberbe	10	20
Liriodendron tulipifera (the tulip-tree)	30	90
Magnolia glauca	10	20
„ acuminata	30	40
„ conspicua	20	30
„ Alexandrina	10	15
„ speciosa	10	15
Mespilus germanica	15	20
And other varieties of medlars, as the Nottingham, Dutch, and stoneless.		
Morus nigra (the common mulberry)	20	30
Negundo fraxinifolium (the ash-leaved maple)	30	40
„ crispum	20	—
„ variegatum	20	30
Ostrya vulgaris (the hop hornbeam)	30	40
Pavia rubra	10	20
„ erecta	15	—
Platanus orientalis (the plane-tree)	60	80
„ occidentalis	70	80

	FEET.	
Populus alba (the Abele poplar)	80 to	90
„ tremula (the aspen poplar)	50	70
„ monilifera (the black Italian poplar)	100	120
„ fastigiata (the Lombardy poplar)	100	120
„ balsamifera	40	50
Punica Granatum (the pomegranate tree)	10	20
Pyrus communis (the common pear)	20	30
„ foliis variegatis	20	—
„ Malus (the wild apple)	30	35
„ prunifolia rosea	10	20
„ spectabilis	20	30
„ aucuparia (the mountain ash)	20	30
„ pendula		
Quercus pedunculata (the common English oak)	50	100
„ sessiflora	50	100
„ Cerris (the Turkey oak)	50	100
„ rubra (the champion oak)	80	90
„ coccinea	80	—
„ laurifolia	50	60
Robinia pseudo-acacia	40	80
„ microphylla	40	80
„ hispida (the rose acacia)	12	20
Salix americana pendula	10	—
„ babylonica (the weeping-willow)	40	50
„ fragilis	40	50
„ Russelliana	50	60
Sambucus nigra (the common elder)	20	30
„ rotundifolia	10	20
Tilia europæa (the common lime)	60	90
„ rubra	50	80
„ pubescens	50	70
„ heterophylla	30	50
Ulmus campestris (the English elm)	60	80
„ latifolia	60	80
„ cornubiensis	60	80
„ montana (the Scotch or Wych elm)	30	60
„ vegeta (the Huntingdon elm)	50	80

2186. Elms must be introduced sparingly; and I have purposely excluded the ash, as their roots run along near the surface, starving every tree in their vicinity, and the top is never sufficiently striking to repay the injury they inflict. With the elm the case is different; although a gross feeder, and an indefinite multiplier of greedy roots, its effect in park or pleasure-ground scenery is magnificent in the extreme.

Evergreen Shrubs.

	FEET.	
Acuba japonica	4 to	8
Berberis dulcis	2	5
,, Aquifolia	3	—
,, Darwinii	3	4
,, japonica	3	—
Buxus (box) latifolia, glauca, marginata, argentea, varying from	4	8
Ceanothus azureus	5	10
,, dentatus		
Cerasus lusitanica (the Portugal laurel)	10	25
,, Laurocerastus (the common laurel)	10	20
,, parviflora	5	10
Cistus purpureus	3	4
,, latifolius	3	4

	FEET.	
Cistus cyprius (the common gum cistus)	5 to	6
,, lusitanicus	3	—
Cotoneaster rotundifolia	3	4
,, thymifolia	3	4
,, buxifolia	35	—
Cratægus pyrocantha	4	10
Daphne pontica	4	5
,, latifolia		
,, Cneorum	1	—
,, indica rubra	3	—
Helianthemum candidum	3	—
,, New Double Yellow	1	—
,, New Double Orange	1	—
Hypericum calycenum	1½	—
Ilex Aquifolium (the common holly)	10	30

2187. As many varieties of the plain and variegated as you can find room for. There are about fifty varieties grown in most large nurseries, all beautiful and worthy of cultivation. Find out, if possible, the sorts that thrive best in your neighbourhood, and purchase them only.

	FEET.	
Laurus nobilis (the sweet bay)	20 to	30
,, salicifolia	10	20
,, crispa	5	20
Ligusticum vulgare buxifolium lucidum (the Chinese privet)	10	20
Mahonia fascicularis	3	6
,, trifoliata	3	4
,, Fortunii	3	4
Phillyrea latifolia	10	12
,, media	10	15
Ruscus aculeatus (the butcher's broom)	1	2
,, racemosus (the Alexandrian laurel)	4	—

	FEET.	
Spartium junceum (the Spanish broom)	8 to	10
Tamarix gallica	5	10
Ulex europæa (the furze)	4	5
,, ,, flore pleno	4	6
Viburum Tinus (Laurestinus)	8	10
,, lucidum	4	—
,, variegatum	3	—
Yucca gloriosa	3	5
,, ,, foliis variegatis	4	—
,, superba	3	6
,, filamentosa	1	—
,, ,, foliis variegatis	1	—

Deciduous Shrubs.

	FEET.	
Aralia japonica	10 to	12
Buddlea globosa	10	—
,, Lindleyana	4	6
Calycanthus floridus	6	8
,, ovatus	4	6
,, rubracaulis	4	6
Ceanothus americanus	2	3
Chinonanthus fragrans	6	10
,, grandiflorus	6	10
Cornus sanguinea (the common dogwood)	10	—
,, alba	6	10
,, siberica	6	10
Coronilla Emerus	4	10
Daphne Mezereum	4	—
,, ,, flore pleno	4	—
,, autumnalis	4	—
Deutzia scabra	4	6
, corymbosa	4	6

	FEET.	
Deutzia gracilis	2 to	—
This variety requires a sheltered warm place.		
Euonymus europæus	20	—
,, ,, fructu albo	13	—
,, nanus	2	—
Forsythia viridissima	3	4
Genista radiata	2	3
,, hispanica	1	—
,, tinctoria	1	3
,, ,, flore pleno	1	—
,, prostrata	6 inches	
Hibiscus syriacus foliis variegatis	5ft.	—
Also the double purple, white and red	3	—
Hydrangea arborescens	4	5
,, hortensis	3	—
,, japonica	3	—
Hypericum, all the varieties	3	5

	FEET.	
Kerria japonica	3 to	5
,, ,, flore pleno	3	5
Leycesteria formosa	6	8
Ligustrum (the privet) all the varieties	6	10
Lonicera (the honeysuckle)	4	—
,, Xylosteum (the fly Honeysuckle).		
,, fragrantissima	4	—
,, albiflora	4	6
,, cærulea	3	5
Pæonia Moutan, all the varieties	4	5
Philadalphus coronarius (Syringa)	10	12
,, ,, flore pleno	1	10
,, variegatus	6	—
,, latifolius	8	—
,, grandiflorus	8	10
Potentilla fruticosa	2	4
,, glabra	2	—
Ribes speciosum	4	6
,, sanguineum flore pleno	4	8
,, atro-rubeus	5	—

	FEET.	
Ribes, the whole species, from	2 to	6
Rubus laciniatus	4	10
,, fruticosus flore pleno	4	—
,, ,, flore pleno roseo	6	12
Spiræa corymbosa	4	5
,, salicifolia	4	—
,, arifolia	6	8
,, grandiflora	6	—
And the whole are beautiful, varying in height from	3	8
Syringa vulgaris (the common lilac)	10	20
,, ,, flore pleno		
,, alba	10	20
,, Charles X.	10	—
,, persica (Persian lilac)	4	6
,, rothomagensis	6	8
,, Siberian lilac	6	8
All are beautiful.		
Viburnum sterile (Guelder rose)	10	—
,, prunifolium	6	10
,, dentatum	4	6
Wiegelia rosea	5	6
,, amabilis	5	6

2188. Choice list of American plants, which, although they may thrive in any good soil generally, do best in peat-earth :—

	FEET.	
Andromeda floribunda	1 to	2
,, grandiflora	1	2
,, polifolia	1	—

But the whole are beautiful, *floribunda* being the best.
Azalea procumbens, 6 inches.

2189. There are over a hundred varieties of these grown in many nurseries. They vary in height from three to five feet, and the great thing in ordering them is to secure the colours as distinct and striking as possible. They vary in price from 1*s.* 6*d.* to 3*s.* 6*d.* ; are perfectly hardy, of beautiful habit, and of the most delicate and lovely colours.

2190. *Ericas.*—The whole are beautiful. A few of the best have already been named in this work.

Gaultheria procumbens	6 inches.	
	FEET.	
Kalmia latifolia	3 to	10
,, myrtifolia	2	3

By far the most beautiful of all the Kalmias.

	FEET.	
Kalmia rubra	3 to	5
,, angustifolia	2	3
Ledum palustre	2	—
,, decumbens	2	—
,, latifolium	2	4

2191. *Rhododendrons.*—Since the rise of the great Bagshot and Knaphill nurserymen, these have not only increased and multiplied, but improved so rapidly by crossing, that they are now, without exception, the most splendid and magnificent of all our hardy shrubs. They are also so cheap as to be brought within the reach of all, and yet many of them so valuable as to continue the luxuries of the rich. They vary in price from 15*s.* a hundred to 15 guineas a plant. Nothing equals the common Ponticum for underwood in plantations, or furnishing cover for game. There are about eighteen or twenty varieties of this class alone, including almost every shade of colour. The splendid Catabiense variety has been almost equally fruitful in hybrids, and presents its formidable list of albums, roseums, purpureums, splendens, &c.

2192. Amidst hosts of other hardy hybrids, from the scarlet arboreum, perhaps the following dozen are as good as any :—Blandyanum, Aclandianum, Atrosanguineum, John Waterer, Nobleanum, Maculatum grandiflorum, Roseum picturatum, Mrs. John Waterer, Victoria, Towardiana, Duchess of Sutherland, and Parryllianum. But, doubtless, there are a hundred more almost as good. Unless you have considerable experience, it is best to leave the selection to the nurseryman, stating the price per dozen or hundred. Fine plants of the above will range from 5*s.* to two guineas each. In addition to all these plants, few gardens can be furnished without some climbing or trailing plants to run up trees, scramble over poles or rustic buildings, or cover walls. The following will be found adapted to any of these purposes :—

	FEET.	
Amplopsis hederacea (Virginian creeper	30 to	50
,, bipinnata	10	20
Aristolochia Sipho	30	—
,, tomentosa	25	—
Bignonia capreolata	15	—
Clematis Flammula	15	—
,, orientalis	15	—
,, Hendersoni	15	—
,, florida flore pleno ...	10	—
,, Sieboldii	10	—
,, lanuginosa	8	10
,, purpurea	15	—
Hedera (the ivy)		
There are about a dozen varieties, varying in the shape and colour of the leaves. They will be better chosen by sight than by name.		
Jasminum revolutum	10	15
,, officinale (the common jasmine)	20	30

	FEET.	
Jasminum grandiflorum	30 to	—
,, nudiflorum	6	18
Lonicera Periclymenum belgicum (the Dutch honeysuckle)		
,, sempervirens (the trumpet honeysuckle)...	6	10
,, grata (evergreen honeysuckle	10	20
Early Red honeysuckle	10	20
Passiflora cærulea	30	—
Tecoma radicans	20	30
,, major	30	—
Vitis cordifolia	20	30
,, apiifolia	15	20
Westaria frutescens	100	—
,, chinensis...	150	—
,, ,, alba...	12	—
And a whole host of Banksian, Boursault, Ayrshire, and other roses.		

2193. Plants enough are here enumerated to furnish a ducal residence, and enable the amateur to select what he thinks most desirable for his purpose. It is better, however, to plant a dozen, 100, or 1,000, of any one plant that thrives well in the locality, than grow those, merely for the sake of variety, that experience proves do not thrive in any given place. Healthy growth, after all, constitutes the great charm, and, this secured, a place furnished with twenty species may be more interesting and beautiful than one planted with a thousand.

2194. Having now furnished a practical answer to the inquiries, when, how, and what to plant, we will proceed to other matters. November is the very best month in the whole year to lay turf, and an old common the best possible place to procure it from. It may still, however, be proceeded with. The most convenient size is a yard long, a foot wide, and an inch thick. This, wound up in rolls, is the best size for carting, unwinding, &c. : it can be taken up at this size at the rate of 8*d.* per hundred. Thus, enough to cover 100 square yards will only cost 2*s.* for removal. After all the improvement in lawn-grasses, there is no plan of covering a lawn equal to turfing it *over:* a good, solid, smooth surface is secured at once. Under the most favourable circumstances, three or four years must elapse before the same point could be reached by sowing: all that is necessary is to make the surface of the required shape, unroll the *turf* close together, beat it firmly down, and frequently roll it, and the work is finished.

2195. The next best method of covering ground with grass is what is termed *inoculation.* Pieces of turf are torn, not cut into pieces,—say two inches square, and thrown on to the ground, leaving interstices of the same distance, or less or more, between them. Grass-seed is then sown over the ground, and the whole firmly beaten down. It is astonishing how soon a splendid turf is thus formed.

2196. The pruning of deciduous trees and shrubs should also be proceeded with, unless during severe frost. Most evergreens are best pruned in April. Nevertheless, as that is a busy, and this a comparatively leisure season, the hardiest evergreens, such as laurels, &c., may be pruned now; any, however, that require cutting down, had better be left till that period. We prune mainly for three leading purposes; to improve the shape, curtail size, and to induce a profusion of bloom or fruitfulness. The first is entirely a matter of taste; the second of space; and the third the primary object, for which all flowering shrubs and trees are cultivated: the two first are entirely effected by pruning the top; the last is more effectually secured by cutting in the roots. This latter does not necessarily, however, supersede the former; often both may proceed simultaneously with advantage. One of the chief points in the management of shrubberies is so to prune them and cut down the plants as always to preserve a dense thick bottom. The digging, pointing, top-dressing, and cleaning of old shrubberies, should also be proceeded with, the turf frequently swept and rolled, the gravel kept scrupulously clean, and every possible thing done to make this outside *winter garden* attractive and useful during the bleak winter and spring months.

2197. *Flower-Garden.*—The beds here, disrobed of their summer beauty, will either be furnished with shrubs, herbaceous plants, annuals, or bulbs, or simply roughed up for the winter. Previous to either being done, it is hoped that they received a liberal top-dressing of manure. It is as vain to expect to grow the majority of bedding-plants successively for years on the same soil without enriching it, as it would be successful to produce good vegetables on the same starving regimen; indeed, many of these plants (verbenas for instance) *draw* the soil as much as a crop of cabbage. If every bit of weed, short grass, and other refuse that comes off the garden annually, is conveyed to a heap, occasionally turned over and saturated with manure-water, a most valuable dressing for the beds will be provided at a cheap rate. I prepare about fifty or sixty loads of such dressing by this means annually, and, indeed, it is all the enriching that an acre of flower-beds has had for these last seven years, except an occasional deluge of manure-water. Roses should have something richer: in fact, nothing is too good for them, and I compromise matters by allowing the land-steward at the rate of three loads of my dressing for his meadows, for every load of rich manure received for our roses. Roses may still be planted, although the sooner this work is finished the better for next season's bloom. Plant as many on their own roots as possible; they are more durable, and I think more beautiful in this form than any other. All newly-planted roses should be mulched over with three or four inches of light dungy litter on the surface. Examine and renew the labels on these and all other named shrubs and herbaceous plants; provide stakes and pegs, and make labels in bad weather. Take stock of, and finally decide on, the disposition of your bedding stuff: sweep, roll, and mow, if need be from the mildness of the season, your turf. Keep your gravel bright, clean, and as hard as adamant, and by such means make the flower-garden, *even in ruins*, a cheerful, comfortable, winter promenade.

2198. *Reserve-Garden.*—Annuals, to stand the winter here, will probably require some slight protection. Carefully watch against the inroads of mice, rats, snails, &c. Not only bulbs, but even young plants, are often devoured by the two former; and in mild winters a little black slug will clear off whole beds of annuals. Let every vacant space be roughly dug up, manured, &c.: choice beds of tulips, anemones, &c., sheltered in bad weather, and the whole examined daily to guard against accident and ward off disease.

2199. *Florists' Flowers.*—Dahlia roots stowed away in cellars, &c., must be carefully and frequently examined to see how they are keeping, and any scarce sorts placed in heat towards the end of the month, to insure a large stock before May. Although the aster threatens to infringe upon the domain, and supersede the use to a large extent of the dahlia, yet, for exhibition and decorative purposes, it is still a noble flower. I subjoin a list of a dozen first-rate fancy and show varieties:—

Fancy Class.

	FEET.
Blondin,—yellow-flaked; bright, red, large, and good crimson ...	4
Beauty of Etruria,—dark buff, spotted, and striped	4
Confidence,—crimson-striped ...	3
Eclat,—purple-tipped, white ...	3
Gem,—rosy-crimson; small tip, bright yellow...	3
Miss Jones,—maroon, tipped white	3

	FEET.
Norah Creina,—orange, tipped white	4
Pauline,—tipped white	3
Striata,—superb lilac, striped deep purple	4
Spotted Gem,—buff striped, and spotted orange	4
Summertide,—chocolate, tipped white	4

Show Varieties.

	FEET.
Andrew Dodds,—darkest flower out	3
Beauty of Hilperton,—purple, large, and fine	4
Criterion,—rose lilac; large and fine	4
Etonia,—buff; fine shape	4
Heroine,—soft peach, with bronze tip	4
Joy,—blush white, tipped with cherry	3

	FEET.
Madge Wildfire,—bright light scarlet; fine	4
Madame Perault,—bright pink carmine	3
Mrs. Barnes,—blush white; constant	3
Mrs. Crawford,—deep scarlet ...	3
Mrs. H. Oakes,—primrose-yellow; fine shape	5
Norfolk Hero,—chestnut-brown...	3

2200. Carefully dry dahlia seed preparatory to sowing in pans next month, and see that all the labels are firmly attached to the roots. The above, and other equally good varieties, can be purchased at from 12*s.* to 18*s.* a dozen.

2201. Pinks and carnations, in beds, will require pressing firmly into the earth after severe frost. Examine the beds for slugs in mild weather, and see that the plants are not destroyed by rats and mice.

2202. The same precautions are necessary with pansies in beds in the open ground. It is best to keep a stock of autumn-struck cuttings of these in pots, to fill up blanks, and insure against accidental deaths. The following dozens will be found good:—

Dr. Fleming,—shaded purple; large and fine.
General Havelock,—deep golden yellow.
Vesta,—primrose; self.
Lord Palmerston,—rich velvety purple.
Caroline,—white ground, heavy purple belting; fine.
Isa Craig,—medium belting; clear and fine.
Mrs. Hopkins,—white ground, purple belting; dense blotch.
British Sailor,—gold ground; heavy maroon belting.
Chancellor,—gold, with crimson maroon belting.
Richard Headley,—yellow ground, shaded bronze; belting fine.
President,—rich gold, dark maroon belting.
Wallace,—dark belting on a yellow ground; fine.

Fancy Class.

Anna,—yellow, shaded maroon; black blotch.
Belle Esquimoise,—white ground, immense dark blotch.
Butterfly,—white and blue upper petals, under bronze; striking and beautiful.
Duchesse de Brabant,—yellow and bronze; fine.
Etoile du Nord,—yellow bordered, purple lilac blotches; extra fine.
Iris,—light purple, lucid yellow; fine.
Miss E. Bining,—white; dark blotches; fine.
Noemi Demay,—gold, with immense blotches; fine.
Octave Demay,—rich yellow, large blotch; fine.
Princess Alice,—creamy white, with dark blotch.
Talma,—yellow maroon top; immense blotches.
Zouave,—light yellow blush; purple belt.

2203. *Tulips.*—If planted early last month, some of these may be peeping through the soil: if so, they may be protected by having a slight pyramid of sandy peat-earth or leaf-mould placed over them. During very frosty weather the beds or rows must be covered with mats, woollen nets, &c., as nothing injures these bulbs more than severe frosts on their crowns just as they are coming through the ground. The ground for these bulbs should be trenched from two feet to 30 inches deep, mixed with a liberal dressing of well-rotted manure. It is a also a good plan to place a layer of manure about six inches from the surface, so that it may be readily and speedily available for the roots. The bulbs should be planted six inches square and four inches deep, and any period from the middle of October to the middle of December will do for planting them. For brilliancy of colour, diversity of height and time of blooming, sweetness of perfume, and striking showiness, we have nothing to equal the tulip. Ribbon borders and masses of colour may be formed of this bulb alone, rivalling and throwing into the shade all our summer and autumn beauties. Of Dwarf Duc Van Thols alone, we have all the colours necessary to form effective ribbon borders with the exception of blue. And the splendid blue of the crocus is ever ready to supply the *blue* wants of the tulip. Thus, the

Back row, scarlet.
Next „ yellow.
Next „ red.
Next „ white.
Front row, blue crocus.
Or, yellow, scarlet, white blue.
Or, white, scarlet, yellow, red, white, blue, &c.

2204. Other varieties of early, single, and double tulips, afford even greater material for this kind of display. Among them there are several violet colours, such as Blue Flag, &c., which approach to and may take the place of blues. Nearly all the arrangements of colours already recommended and illustrated in this work can be carried out by the aid of tulips alone, or, at least, slightly assisted with crocuses. Their neat habit renders them peculiarly adapted for describing patterns on beds or borders, and frames: circular, curved, or polychrome forms may be indicated by them to the greatest nicety. The following are good varieties:—

Single Tulips.

Bride of Haarlem,—white striped, crimson
Canary-bird,—pure yellow.
Couronne Pourpre,—dark wall-flower.
Cramoise Royale,—white, with rosy-violet crimson.
Dorothea Blanche,—white, striped with cerise.
Duc de Brabant,—yellow, striped and feathered crimson.
Duchesse de Parme,—bronze crimson, bordered yellow.
Globe de Regant,—white, striped with violet.
Grootmaester von Maltha,—white-striped rose.
La Belle Alliance,—brilliant scarlet.
Pax alba,—pure white; fine.
Pottebakker,—white.
„ red, striped yellow.
„ yellow.
Royal Standard,—white, striped bright red.
Silver Standard,—white, striped with scarlet.
Vermilion,—brilliant vermilion-scarlet.
Violet Hâtive,—purplish violet.
White and Red bordered,—white feathered.
White Swan,—pure white; very fine.

Double Tulips.

Blue Flag,—purplish violet.
Blanc Borde Pourpre,—violet, purple bordered; white.
Conqueror,—pure white, feathered with violet-crimson.
Duke of York,—bronze-crimson; margined lines.
Gloria Solis,—crimson, striped golden yellow.
La Candeur,—pure white.
Mariage de ma Fille,—crimson, and white striped.
Over-winner,—violet and white striped.
Pæony Gold,—golden yellow; feathered crimson.
Purple Crown,—velvety crimson.
Tournesol,—scarlet and yellow.
Yellow Rose,—golden yellow.

2205. Then there are the curious, wonderfully showy Parrot Tulips, of which the following are as good as any:—

Coffee-colour.
Constantinople red.
Margraff,—striped, red and yellow.
Monster Rouge,—crimson.
Perfecta,—scarlet and gold.
Fern,—brilliant scarlet.
And Monstrosa, which is monstrously beautiful.

2206. Show, or late-flowering tulips, of which a single bulb used to be worth a prime carriage-horse, are exquisite in shape and colour, and are divided into three classes,—bizarres, which have yellow grounds, feathered or striped with crimson, purple, or white; byblomens, white ground, flaked or striped with black, lilac, or purple; and roses that have white grounds, feathered or striped with crimson, pink, or scarlet. In each of these classes many exquisitely beautiful named flowers exist; but any one intending to grow these should visit some good collection, such as the Battersea, St. John's Wood, or Slough, when they are in flower, and choose for himself.

2207. Soon after tulips have finished flowering, the leaves will ripen and die off. They should be immediately taken up with all the soil that will adhere to the bulb, slightly dried, and put away in drawers or paper bags, each sort by itself. During the summer they should be frequently looked over to see that they are not decaying. On the 1st of October rub off all the offsets, and plant them by themselves, and prepare for planting the entire stock as already directed.

2208. Amidst the many floral beauties claiming our attention, we still give a prominent place to the tulip; and considering its many great merits, we may, without flattery, dismiss them in the language of Thomson :—

"Then comes the tulip race, where Beauty plays
Her idle freaks; from family diffused
To family, as flies the father dust,
The varied colours run; and while they break
On the charm'd eye, the exulting florist marks
With secret pride, the wonders of his hand.
No gradual bloom is wanting from the bud
First-born of spring, to summer's musky tribes;
Nor hyacinths of pure virgin white,
Low, bent, and blushing inward; nor jonquils
Of potent fragrance; nor narcissus fair,
As o'er the fabled fountain hanging still.
Nor broad carnations, nor gay spotted pinks,
Nor, showered from any bush, the damask rose,
Infinite numbers, delicious smells,
With hues on hues—expression cannot paint—
The truth of Nature and her endless bloom."

2209. As the year closes, and we wait in hope for the coming forth of the flowers, let grateful reverence swell our hearts as we exclaim with Hemans :—

"I love Thy name,
That Thou hast mantled the green earth with flowers,
Linking our hearts to Nature! By the love
Of their wild blossoms, our young footsteps lost
Into her deep recesses are beguiled,
Her minster cells, dark glens, and forest bowers,
Amidst the low religious whisperings,
The silvery leaf sounds of the solitude,
The spirit wakes to worship, and is made
Thy living temple."

D. T. F.

§ 3.—THE KITCHEN-GARDEN.

2210. We are now in the dead of winter. Nature has done her part towards producing a supply of suitable matter for the table, and if the gardener has done his part, there need be no lack of suitable crops; but what there is must now be depended on for some time to come, for vegetation is at a stand-still, and whatever seeds or plants are put in the ground now, will not move or grow for two or three months to come; but if vegetation does not move, that is no reason why man should not. The experienced gardener knows the importance of winter operations, and knows, in fact, how work, judiciously done now, will save much toil in the spring and summer. Supposing it is only necessary to manure the ground once a year, let it be done in the winter ; it is generally most convenient, and the work is better adapted to the season. Digging and trenching is much better done now than in warmer weather, and this more particularly applies to heavy soils ; some I have known cannot be cropped at all unless dug a month or six weeks beforehand, either summer or winter : and how much more advantageous it is to move the ground, and let it lie in clods so that the air permeates around them, and the action of frost brings it into a state easy to work, and better for the seeds. There being now most likely some portion of ground vacant, and no general cropping can be done for some time, a little attention can well be given, and would be well bestowed in considering the important matter of a rotation of crops ; if no regular system has been adopted before, let it be decided at once to begin a systematic arrangement of the various subjects to be dealt with. Much more work may be done under a proper system than continuing the haphazard style ; and not only so, but a great many more subjects may be grown on a given space by giving each group its proper place.

2211. Respecting crops, individually, little can be done, and as little said, at present ; but collectively, some attention should be given, both to the various stores of seeds and vegetables ; the latter should be looked over occasionally, turned, sorted, and cleaned ; kept moist without being damp, cool without frost, and where there is a free circulation of air. As to seeds, it is well to have them ready for sowing ; that is, thoroughly dried and rubbed out, every particle of husk and light seed blown out, and carefully papered and labelled. Those that have to be purchased should be procured early. Go to respectable dealers, who can be certain of the sorts being true to name. Note down and procure exactly what will be required for the season, so that no time is lost in running after them the moment they are wanted, and place each sort in its proper drawer or receptacle, that there may be no confusion. Also see to the tools or implements, and ascertain that they are in good condition ; replace or repair any that are broken ; never trust to just the right number if any are not in good condition ; keep them dry, and clean well before hanging them up. Another thing to attend to, is proper composts and manures. These may be collected on a spare or vacant piece of ground in the kitchen-garden, where there will be plenty of room to turn it over and mix, and where all kinds of woody refuse can be collected and charred and mixed with it. In frosty weather, when the ground is hard, it should be wheeled on to vacant ground. Again, much time is saved in the spring and summer, by making a general pruning and trimming of trees. Most trees will be improved by a little cutting-out ; it prevents them making so much dead wood. Collect all these prunings ; take the bill in hand, and look over the sticks ; see what are useful for supporting peas and beans. Select them both for tall and dwarfer sorts. Keep them all separate ; trim them into shape, and point them ; tie them into bundles, and store them up in a dry place ready for use: the remainder may be tied up in faggots, which are useful for various purposes, or, if chopped short and stored in a dry place, will be useful for lighting fires. Let neither time nor material of any kind be wasted; it is wonderful to what uses a little ingenuity can apply them.

2212. *Seakale.*—Some may be covered for forcing. Place the kale-pot over a bunch of crowns; see that enough is covered: then having previously prepared and shaken out the dung, and got it into a condition to maintain a moderate heat, cover the pots to a thickness of about three feet from the ground: too great a body of dung is apt to heat too violently, and spoil the crowns. Give just enough to maintain a moderate heat, and no more: it will be ready to cut in about three weeks, proportioned to the amount of heat. Some gardeners cover with leaves, which answers the purpose; but in collecting leaves, a great many slugs and other vermin are collected with them. These do mischief to the kale, otherwise the effect is the same.

2213. *Rhubarb* may be treated in a precisely similar manner, but requires larger pots; and none but the earliest sorts should be forced.

2214. *Peas and Beans* of the earliest kinds may be sown on light ground; but it is not advisable to sow many. Those sown in February will be as early within a few days, and much more certain.

2215. *Celery.*—Cover with litter, if possible, in frosty weather. It will be so much better to take up, besides keeping it fresh and uninjured.

2216. *Parsnips* and other crops that remain in the ground ought to be covered with litter or leaves. The slightest covering will make a vast difference in case of sharp frost, which should always be bargained for at this time.

2217. *Endive.*—Blanch with pots, and cover with litter; and a good supply may be kept up the whole winter without having recourse to frames, the litter helping to blanch it before the pots are put on; but a dusting of lime should be given occasionally to destroy slugs, which are very fond of endive.

2218. *Broccoli, &c.*—It will now be seen what advantage there is in giving the various sorts of brassicas plenty of room, and also giving them a place to themselves in a clear open spot. Those planted among other crops are shanky, and more exposed to the frost, while those planted open, are short, firm, and stocky, and far more likely to stand severe frost. Let this be considered in cropping next year.

2219. This is the best time to make any general alterations. Where old bushes are to be grubbed up, and the ground prepared for cropping, or where young bush is to be planted, also where drainage is necessary, now is a good time to do it before the winter rains make a swamp of the garden. Set the edgings and paths in order, and carefully remove any accumulation of rubbish which is likely to harbour vermin. *Herb beds* should be cleared, and made as neat as possible, both for the appearance and well-doing of the herbs.—F.C.

§ 4.—The Fruit-Garden.

2220. December is the month of rest here as in other departments of the garden; but there is much to be done which is too often left undone. Planting may now be presumed to be over; at least, unless the weather is unusually mild, it will be well to prepare the ground, and leave the planting until the early spring.

2221. Peaches, nectarines, and other wall-trees, now require pruning, and the shoots selected nailed in; but both operations should be avoided in frosty weather, pruning in such weather being apt to lacerate the sap-vessels and destroy the shoots, which die back under its influence.

2222. Standard apples and pears should now receive their final autumn pruning and thinning out, the latter being chiefly exercised on the interior branches of the tree, so as to admit of a free current of air through it; badly-placed shoots remove; espalier trees, and trees planted against a wall for horizontal training, do best when the shoots are tied down; in the absence of trellis on the wall, therefore, studs should be driven into the wall at convenient distances for that purpose, in order to avoid the stiff and formal distortion the branches undergo in the old process of nailing with shreds.

2223. The modern system of dwarfing fruit-trees, by which space is so much economized, is produced by a special course of pruning, commencing a year from grafting, when the apple-tree should be pruned back, leaving about eight buds on the shoots. In the second year the head will exhibit eight or ten shoots, and a selection must now be made of five or six, which shall give a cup-like form to the head, removing all shoots crossing each other, or which interfere with that form, thus leaving the head hollow in the centre, with a shapely head externally, shortening back the shoots retained to two-thirds or less, according as the buds are placed, and leaving all of nearly the same size. In the course of the summer's growth the tree will be assisted by pinching off the leading shoots where there is a tendency to overthrow the balancing of the head. At the third year's pruning the same process of thinning and cutting back will be required, after which the tree can hardly go wrong. The shoots retained should be short-jointed and well-ripened; and in shortening, cut back to a healthy, sound-looking, and well-placed bud. After the third year, little or no shortening back will be required, especially where root-pruning is practised; the tree should now develop itself in fruiting stems, which will subdue the tendency to throw out gross or barren shoots.

2224. Large standard trees in their prime only require pruning once in two or three years. At these intervals cross-growing or exhausted shoots, especially those in the centre of the tree, require thinning out, bearing in mind that the best fruit grows at the extremities of the branches, and keep those branches under control.

2225. The apple is somewhat capricious; some affecting clay soils, while others do better in sandy loam, and even in well-drained peat soils. The sorts planted, therefore, still require some discrimination as well as observation as to the sorts most successfully grown in the locality :—

Dessert Apples.

Early Harvest,—ripens end of July.
Margaret,—early in August.
Calville rouge d'Eté,—middle of August.
Devonshire Quarrenden, — middle of August.
Barowski,—end of August.
Early Julian,—in August and September.
Summer Pippin,—beginning of September, but of short duration.
Monstrous Pippin,—September and October.
Oslin, a high-flavoured apple,—ripens in September.
King Pippin,—end of September.
Reinette blanche,—in October and November, in France.
Quatre Gouttes côtelées,—in October and November, in France.
Scarlet Crofton,—ripens with us in October.
Early Nonpareil,—in October, and keeps till March.
Potmaston Nonpareil,—in October, and keeps till March.
Court of Wick,—in use from October, and keeps till March.
Calville de St. Saveur,—ripens in November, in France.
Belle Fleur de Brabant,—in November in France.
Reinette d'Angleterre,—in November in France, and keeps till March.
Downton Pippin,—ripens in November, and keeps till January.
Golden Pippin,—popularly supposed to be extinct, grows vigorously on a warm soil and in sheltered situations, ripening in November, and keeping till March.
Reinette dorée (Golden Reinette),—ripens in November, and keeps till April.
Ribston Pippin, — in November; keeps till May.
Ross Nonpareil, — in December; keeps till February.
Cornish Gillyflower,—in December keeps till February.
Queen of the Reinettes,—in December; keeps till February.
Reinette du Canada,—in January and February.
Royale d'Angleterre, — in January, and keeps till March.
Wyken Pippin,—in January; keeps till March.
Old Nonpareil,—in November; keeps till May; a fine high-flavoured dessert apple.
Lamb's Pearmain,—in December; keeps till June.
Reinette Franche,—in use from February to July and August.

Cooking Apples.

Keswick Codling,—fit for use in July and August.
Monk's Codling,—fit for use from July till February.
Golden Winter Pearmain,—in use from October till January, as a kitchen as well as dessert apple.
Beauty of Kent,—in use from October till February.
Bedfordshire Foundling,—in use from January till March.
Winter Pearmain,—in use from November till April.
Winter Majetin,—in use from January to June.
Norfolk Beefing,—keeps till June.
Gooseberry Apple,—ripe in January, and keeps till June or July.

2226. *Pears* endure exposure to extreme heat better than the apple, the latter requiring a fresh and somewhat humid atmosphere; the pear, on the contrary, loves a deep silicious soil, fresh, but dry. This last quality must be secured by drainage, if the soil is not naturally dry. The varieties of the pear are very numerous, there being upwards of 500 varieties known. Of these 500 the following is a

Selected list of Table Pears :—

Beurré Giffart,—ripe in July; suitable for a standard.
Citron des Carmes,—ripe in July.
Epargne,—in July and August, suited for espalier on an east or west aspect. Does not make a good pyramid.
Beurré Beaumont,—as a standard; ripe in August.
Jargonelle,—ripe in August.
Bon Chrétien William, — a standard, grafted on a free stock; ripe in August and September.

Beurré d'Amaules,—a standard; August and September.
Professeur du Breuil, — suited for espalier and east or west aspect.
Beurré d'Angleterre,—grafted on a stock as a standard; ripe in September.
Louise Bonne de Jersey,—an espalier on free stock; east aspect; ripe in October.
Beurré Gris,—an espalier on free stock; east and west aspect; ripe in October.
Beurré de Capeaumont,—espalier on free stock; east and west aspect; ripe in October and November.
Duchesse d'Angoulême,—as an espalier on east, west, or north aspect; ripe in October and November.
Bon Chrétien Napole,—espalier on free stock; east or west aspect; ripe in October and November.
Seckle,—ripe in October.
Beurré Diel,—an espalier on east, west, or north aspect; ripe in November and December.
Beurré passé Colmar,—espalier on free stock, for east, west, or north aspect; ripe in November and December.
Althorpe Crassane,—ripe in November.
Hacon's Incomparable, — in December and January.
Glou Morceau,—in December and January.
Knight's Monarch,—in January.
Easter Beurré, — in March; keep till March.
Beurré de Rans,—espalier for east, west, or south aspect; ripe in February and March.
Neplus Meuris,—in March and April.

2227. *Bush Fruit.*—Gooseberry and currant trees, if not pruned last month, should be finished without delay. Suckers of raspberries should be taken up, but the pruning should be deferred till March.

Select list of Gooseberries.

Early yellow,—rough; first ripe sorts.
Warrington's,—for preserving.
Whitesmith,—for using green.
Turkey reds,—for the table.
Champagne,—for the table.
Greengage,—for the table.

List of Currants.

Black, common.
Black Naples.
Red currants,—for preserving.
White currants,—for the table.

List of Raspberries.

Falstaff,—an excellent bearer.
White and yellow,—for the table.
Autumn-bearing,—ripe in September.

2228. *Strawberries.*—The British Queen is one of the best in cultivation; but all soils do not suit it, and in others the apex remains green and hard when the rest of it is ripe. It is now generally believed that the plants require protection during severe winters, and that a light covering of fern, pea-haum, straw, or other light material, will preserve the plants in vigour at a slight cost.

List of Strawberries.

Black Prince,—a good early sort.
Keen's seedling,—an excellent sort for general use.
British Queen,—is excellent for flavour where it succeeds.
Elton Pines,—excellent for late crops.
Alpines,—the best late bearers.
Hautbois,—has peculiar flavour.

2229. *Standard Fruit-trees.*—Thin out ill-placed branches, and where languid growth and barrenness have been engendered by exhausted soil, dig a trench round the tree and lay in some barrowfuls of rich fresh soil; then fork over the surface, and give a dressing of well-rotted stable manure. Where the exhaustion arises from the tap-root having penetrated to an unwholesome subsoil, dig a trench deep enough to reach the root, and sever it from the tree if it is one worth preserving, and fill up the trench again with good fresh soil, and top-dress with manure.

§ 5.—Plant-Culture under Glass.

2230. Gardening, like fire, is a good servant, but an exacting and tyrannical master. Professedly in most cases, taken up for pleasure, it often becomes a source of annoyance for want of recognizing this distinction. As a servant, gardening is the source of much pure and high enjoyment. As a *master*, it is the cause of much worry and grief. In one word, if work is not done until it *must* be done, or the health or life of our plants compels us to do it, there is no pleasure in the performance, and the chances are that it will be badly done. If we do it when we choose, or because we choose to do it, the doing of it makes us happy, and it will be accomplished in the best manner. Just as the poet, with subject and time prescribed, is fettered and bound when he tries to soar, so is that man who tries to extract pleasure from gardening, and allows his work, either from indolence, ignorance, accident, or uncontrollable circumstances, to *master him*. Therefore, as this is a leisure season of the year, bring up all arrears of work, and see that you start even with the new year. Better, when possible, to do the whole of January work in December, than do one single thing in January that might have been done in December. The re-labelling, cleaning, and arranging of all plants should be diligently forwarded, so that every plant should have its proper name and its best dress on before Christmas. Climbers on roofs and pillars may also have their final pruning, cleaning, and tying; every dead leaf and visible or invisible particle of dirt removed, and all vegetable *house-occupiers* be ready to greet their friendly visitors with that best of all welcomes,—bright clean faces. This, so essential to health everywhere, is especially necessary in the conservatory, where nothing offensive to good taste should ever be seen. The interest of this house is often much increased at this season by introducing some pots of Christmas roses, hyacinths, narcissuses, &c., from the forcing-pit. The edges of the beds, shelves, and vases may also be decorated with variegated and plain holly, and pillars from which fuchsias or other climbers have been removed, be wreathed in the same manner. These, with occasional syringing, will keep fresh for six weeks, and very much increase the interest of the house. The chrysanthemums will continue flowering during the month, and camellias be coming on to supply their place. Rhododendron arboreum grown for several years under glass, will also flower now in the conservatory without any forcing. On several successive Christmas-days I had a plant with a hundred blossoms expanded, each truss of bloom nearly as large as my hat. With a very little forcing the following varieties might be got in flower during the month. Except in very sheltered situations and mild seasons, they cannot be depended upon for out-of-door cultivation; but they are splendid for pot-culture:—

Album, superbum, campanulatum, pictum, Gloire de Gand, nobleanum, pulchellum, princeps Smithii, Smithii coccineum, venustum, Chandlerii, and Victoria regina.

Beautiful plants of these can be bought from 3*s*. 6*d*. to 10*s*. each.

2231. With the above dozen, and half a dozen plants of arboreum, a magnificent effect during winter and early spring could be produced. Next to rhododendrons, or even exceeding them in usefulness, is the camellia; and this is the month above all others when it is most useful. By inducing early growth and early maturity, it will flower now from habit, as well, if not better, than in any other month. Supposing it to finish flowering by the end of this month, remove the plant to a peach-house or vinery at work as soon as it can be moved from the conservatory. Shift the plant into a larger pot at once if it requires it; at all events, examine the state of the roots, and act accordingly, remembering, however, that the camellia does best to be under-potted. Some prefer not potting until the growth is finished; I think as soon as the last flower drops the best time. Almost any soil will grow camellias. Some grow them entirely in peat, some in strong loam, approaching to clay; and I have seen good plants in both. The best soil I believe to be two parts fibry peat, one fibry loam, one-sixth part sharp silver-sand, and one-sixth part *rotten wood*, or clean leaf-mould. Keep them in a temperature of 55° to 60° until their growth is made and flower-buds formed. During this period they should be frequently syringed, and a humid atmosphere maintained. Towards the end of April gradually remove, by easy transitions, to a cool house or cold pit, and the last week in May to a sheltered situation out of doors, or they may continue in the same house or pit throughout the season. The pot must be placed on a hard bottom to prevent the ingress of worms, should be watered alternately with clean water and weak liquid manure, and finally removed under glass in October. With such treatment their blossoms will expand in November or December, and exhibit to our admiring gaze during those dreary months, the colours they have stolen from the sun's rays under summer skies.

2232. Fine plants, from 18 inches to two feet high, of the following or equally good varieties, can be supplied at from 30*s.* to 42*s.* a dozen; larger plants, from 60*s.* to 120*s.* a dozen:—

Alba-plena, Albertus, Amabilis, Archduchesse Marie, Beata, Chandlerii elegans, Countess of Ellesmere, Countess of Derby, Cup of Beauty, De la Reine, Duchesse d'Orléans, Eximia, Fimbriata, Lady Hume's blush; Grand Frederick, Grandis, Imbricata, Imbricata alba, Jenny Lind, Mathotiana, M. alba, Marchioness of Exeter, Princess Royal, Princess Frederick William, Reticulata, R. flore pleno (this is still expensive), the Bride, Tricolor, Tricolor imbricata pleno, and Victoria magnosa.

2233. Next to these, Indian azaleas claim our notice for conservatory decoration. For flowering now an early habit must be induced. The best plants of Indica alba I have ever grown flowered yearly this month by merely placing them in the conservatory in the autumn. They require a similar growing season after flowering, to the camellia; and until the shoots are sufficiently numerous, or the plants as large as desired, they can be grown on throughout the entire year, and stopped four or five times during that period. This *pushing* treatment will, however, sacrifice the blossom; but if started early, they can be stopped twice, and yet the terminal buds be sufficiently matured in the autumn to develop flower-buds. After the growth is made, the plants should be gradually hardened off, and be placed during September full in the sun's rays out of doors, to thoroughly ripen their wood. Two parts of peat, two of loam, a sprinkling of sand, and one-sixth part of charcoal that has been steeped in urine or other manure-water, suits them well. While growing, they will also bear watering with clear weak manure-water every time that they become dry. Before housing them for the winter, examine the plants, and dip them over head and ears by inserting them into a tubful of equal parts soot-water, made by throwing half a bushel of soot in soap-suds, and tobacco-water. Repeat this dose three times, and every thrip will either take itself off or die. These plants bear forcing well, and either by inducing an early habit, or helping by the aid of the forcing-pit, the luxury of their beauty may be enjoyed in conservatory or sitting-room for six or eight months of the year.

2234. There is an immense variety. The following azaleas, nice plants of which can be supplied from 18*s.* to 42*s.* a dozen, according to their size, are perhaps, as good as any :—

Admiration, Alba, Alba magna, Alba striata, Albertii, Amœna laterita, Ardens, Beauty of Europe, Beauty of Reigate, Blondin, Broughtonii, Chelsonii, Coronata, Criterion, Danielsiana, Distinction, Duc de Nassau, Duke of Devonshire, Empress Eugénie, Exquisita, Exquisita pallida, Fulgens, Gem, Gladstonesii, Gladstonesii excelsa, Gladstonesii formosa, Glory of Sunning Hill, Grande Duchesse Hélène, Formosa variegata, Ditto alba cincta, Ditto alba suprema, Ditto elegans, Magnet, Mars, Optima, Petuniæflora, Prince Albert, Queen of Whites, Queen Victoria, Leopold, Rosea punctata, Rosy Circle, Smithii coccinea, Striata formosa, the Bride, and Triumphans.

2235. Next to these, or even before them, in the order of time, I place winter-heaths and epacrises. Instructions about heaths have already appeared ; I would only give a few lines on epacrises. These should be freely cut back as soon as they are done flowering ; and after the shoots have grown afresh, two or three inches long, is the best time for potting them ; a hard sandy gritty peat is the proper soil. Place them in a close pit, but by no means warm, for a few weeks ; gradually inure to the air, plunge in a sunny situation : see that the wood is brown and hard by the end of September. Remove to conservatory shelf in October, and you will have such a charming profusion and succession of tiny tubes of colour, as nothing but epacrises could exhibit.

2236. As no one ever saw, or ever will see an ugly epacris, it seems almost a loss of time to specify varieties. However, all are not equally beautiful ; therefore invest at once in the following, which can be bought from 9*s.* to 18*s.* per dozen :—

Epacris alba odorata, Albertus campanulata, Impressa, Alba carnea, Alliana delicata, Impressa alba, Impressa floribunda, Alba coccinea, Alba floribunda, Kinghornii magnifica miniata, Kinghornii splendens ; (nothing can exceed these two in beauty) Kinghornii compacta, Kinghornii major (unless it be Sunset and Vicountess Hill ; and in my opinion they do not).

The following generally flower in the autumn :—

Racemosa, Picturata, Mont Blanc, Exquisite, and Fire-ball.

2237. The same principles will apply to giving air, &c., as in November; only, as we have generally more sun this month, more may be admitted. Care must, however, be taken to prevent a cold draught cutting off the beauty of any plant that may have recently come from a warmer house or forcing-pit. Frequently re-arrange the plants, and let the charm of change and freshness add grace to the glow of beauty, which should distinguish this house in winter.

2238. Where a temperature of 45° is maintained, the various sorts of Epiphyllum truncatum, so often met with in stoves in winter, will bloom well in this house. There are now several varieties of this charming winter-flowering plant, grown as dwarfs in suspended baskets, or as tall plants, umbrella fashion, or as pyramids; worked on the Pereskia, it is exquisitely beautiful. Perhaps it flowers best in a cool stove, but it will flower for six weeks or two months in a warm conservatory.

2239. Potted in a rough mixture of peat, leaf-mould, loam, brickbats, old plaster, and charcoal, and kept in a temperature of 60°, its progress is rapid. During the summer and autumn months, the plants should be fully exposed to the sun in an airy house. Place them in a temperature of 55° towards the middle of October, and now every leaf will terminate in one, two, or three beautiful flowers.

2240. *Stove,* where the Poinsettia pulcheria is holding her levee, and all other plants are falling down to worship this superbly-arrayed Queen of eauty. No description can convey an exaggerated or sufficiently strong idea of the regal beauty of this plant. Half a dozen of them, from four to five feet high, and eight shoots each, terminated by bunches of enormous scarlet bracts, set off by the peculiar shape and colour of the true leaves, is a sight worth going twenty miles on any December morning to see. Any one with a plant-stove may have this treat at home, as few plants are easier propagated or grown. They can be had in flower from October to March. Suppose they flower in December, cut them down to within three eyes of the old wood in the end of January. Put in as many cuttings as you require, in lengths of from four to six inches long. They will strike in any vinery or house at work without shading or any attention whatever, except watering. When rooted, pot singly in 48-sized pots, and return to the same house, or a pit with bottom-heat. If large plants are wanted, they grow best with the latter treatment. When the cutting has made six inches of wood, stop it, and sometimes it will break into three shoots; and this is quite enough for one-year-old plants. Flower these plants in 24-sized pots, and if they have three good branches, terminating in a whorl of scarlet nearly a foot across, you will, or ought to be, more than satisfied. To attain plants of almost any magnitude, allow the old plants to continue rather dry for six weeks after having cut them down; then water and plunge in bottom-heat to break freely. Leave a dozen shoots, and thin off all beyond that, and insert them as cuttings if wanted, to be treated as above. When these shoots are two inches long, shake out the plants, and repot in pots that will just hold the roots in a compost consisting of equal parts leaf-mould, loam, and peat, with a colouring of sand. As soon as these pots are filled with roots, shift in to 12- or 8-sized pots, and return them to the same quarters. By maintaining a bottom and surface-heat from 60° to 70°, syringing twice or thrice a day, and watering carefully, they may be grown to any size you please. If you start them early, the young shoots may also be stopped, and two dozen flowering shoots secured instead of one. But such a plant well grown would require half an ordinary-sized house to hold it; and, perhaps, plants with three to six blooms are the most beautiful, and certainly the most convenient. There is a creamy-white variety of this plant, certainly not to be compared to the other, but still interesting and showy, especially by candle-light.

2241. A beautiful companion-plant to this is Euphorbia jacquiniflora. Its propagation and culture may be identically the same. It possesses, however, one peculiarity in the extreme, which the other also has in a modified form. When you stop a young shoot of this euphorbia, it is seldom that more than a single bud on the stopped shoot will break. By stopping, you gain nothing in advance, therefore, but lose much time. When bushy plants are desired, from three to a dozen cuttings should be placed in one pot, and grown on into plants without being separated. Cut plants may be treated exactly the same as the Poinsettia; but they do not break so freely. For bouquets, vases, or head-dresses, this Euphorbia is one of the finest flowers in existence; a fine spike, 18 inches long, is a matchless wreath at once. The brilliant effect of this plant among begonias, ferns, and other things, must be seen to be appreciated. Some late caladiums, grown for this purpose, will now be intermixing their beautiful leaves with the bright flower-stems of Gesneria cinmabrina, and others. The bright red berries of the Ardisia crenulata will also be exhibiting themselves in striking contrast with the shining green leaves.

2242. *Orchids.*—Rest here should still be the order of the day; nevertheless that rest will be partially broken by the flowering of some or all of the following plants:—Pholænopsis amabilis, several Oncidiums, Cymbidiums, Epidendrums, Cattleyas, Zygopetalums, &c. Maintain a temperature of 60° to 70°, and avoid all stimulating treatment.

2243. *Greenhouses.*—Preserve a minimum temperature of 40°; give as much air as possible; see that the stock is kept perfectly clean by occasional smokings, washings, dippings, &c.; put on a fire on dull mornings to enable you to expel damp; remove heaths, epacrises, &c., to the conservatory as they come in flower; shift young plants of kalosanthus into their blooming-pots as they require it, and keep everything in a quiet semi-dormant state until the new year awakens them to hard work and a new life.

2244. *Pelargoniums.*—Early varieties for cut flowers may be forced into bloom in a vinery or peach-house at work. The general stock will require careful treatment this month. The latest-flowering specimens may receive their final shift, and all will require careful training, a genial temperature of 45°, and great skill in watering and ventilating. Fancy varieties often show a disposition to bloom prematurely. These early flowers must be perseveringly removed to throw the strength into the shoots, to be husbanded up for a perfect inflorescence at the proper season. Keep the plants within a yard of the glass, if possible, to prevent their drawing, and fumigate as soon as one green fly is visible.

2245. *Cinerarias.*—The earliest of these will now be in flower in the conservatory; succession plants will be coming on here. Few plants are so effective for decorative purposes as these. Unless for exhibition, it is best to grow them annually from seed. The first sowing should be made in March, in pans filled with equal parts of peat and loam and one-sixth part sand. They should be well drained, made firm, and the seed slightly covered, and placed on a slight bottom-heat. Keep the pans and young plants, when they appear, partially shaded from the bright sun; put them into 3-inch pots as soon as they will bear handling, return them to the same place, and renew the same treatment until they are thoroughly established in their pots. Then gradually harden them by giving plenty of air, and place them in a sheltered situation out of doors towards the end of May. As the roots reach the sides of the pots, shift them into larger, giving them their final shift in September. The first flower-stems should be cut out close to the bottom when large plants are desired. This will induce them to throw out from six to twelve side-shoots;—these may be reduced, or all left, at the option of the grower. Towards the end of September, they should be returned to a cold-pit, and they will begin to flower in October. No soil is better for growing them than equal parts rich loam, leaf-mould, and thoroughly rotted sheep- or horse-dung, liberally mixed with sharp sand or charcoal-dust, and used in a roughish state. They also luxuriate under the stimulating regimen of *rich* manure-water. Another sowing may be made in April, and a third in May, for very late plants. The treatment of old plants may be similar to this. Cut them down as soon as they are done flowering. Shake them out, and pot each sucker separately in March; then proceed as above in every respect.

List of the best Varieties.

Acme, Adam Bede, Beauty, Brilliant, Duke of Cambridge, Bridesmaid, the Colleen Bawn, Handel, Incomparable, Mademoiselle Parepa, Magenta, Maid of Honour, Miss Marnock, Mrs. Livingstone, Perfection, Queen Victoria, Queen of Lilies, Regalia, Royal Marine, Solferino, Slough's Rival, the Wizard, and Wonderful.

2246. *Calceolarias.*—These are more difficult to manage than cinerarias; they, however, require the same general, but more careful treatment. The seeds, which are very small, must barely be covered with soil in the pans containing them; it should be covered over with a bell-glass or sheet of glass. The young plants are very delicate, and apt to take themselves off without leave; a shady situation out of doors, under a hand-light or a cold-pit, is the best situation for them. As soon as they can bear the most delicate manipulation, the seedlings should be pricked out into other pans prepared as for the seed, and returned to their old quarters. When established in these, the most critical period is over, and they may be potted into larger pots, and heated as recommended for cinerarias, only I think they grow best, during most seasons, in cold-pits. Very few people now think of growing a named collection of herbaceous calceolarias. Those who wish to try must cut them down as soon as they have finished flowering. Place them in a cold-pit to break in, lay in the young shoots when two inches long, and when rooted proceed as with seedlings; or the whole of the old plant may be kept as a single specimen, and if it does not fog off, it will make a grand display next season. Green flies hold carnival among the soft delicate leaves of these plants, and unless speedily destroyed, will consign the entire stock to the rubbish-heap. Fortunately, the flies on these and cinerarias seem to be partially assimilated to the nature of their food, being very soft and easily destroyed. The following semi-herbaceous, or half-shrubby varieties of calceolaria, are propagated and grown like the bedding varieties, and are very beautiful:—

Etna, Ambassador, Hon. Mrs. Adams, King of Sardinia, Lady Franklin, Lucifer, Miss Grey, Magenta, Optima, Pandora, Pervatur, Queen of Oude, the Queen, and Yellow Perfection.

2247. *Cold-pits and Frames.*—Water and cover with care; give all the air possible in mild weather. During a severe storm these may remain hermetically sealed for a week with impunity at a temperature of 35° to 40°. After such a long nap, unwrap cautiously, and shade for a few days from the sun's rays. Examine the entire stock every favourable opportunity.

2248. *Forcing-pit.*—Keep up a growing temperature of 55° to 60°. Introduce fresh batches of shrubs, roses, bulbs, and everything that will flower early, to supply the place of those drafted off for other service. See, however, that the recruits in this reserve corps are properly trained, and dressed in their best uniforms, before they are brought into the front rank under the immediate eye of their commander-in-chief.—D. T. F.

§ 6.—Fruit-Culture under Glass.

2249. Well, it is more hopeful than last month. We have a clearer atmosphere and more sunlight. Besides, if vegetable life is still asleep, it is at least nearer the period of waking up.

2250. *The Vines* have been awake for weeks; they are now showing branches. Well, bring artificial heat to your aid, and keep a night temperature of 60° and a day one of 70°; admit every possible ray of light; keep the leaves within nine inches of the glass, and create a midsummer climate in December. Examine frequently the state of the borders, and keep the roots as warm as the tops. Stop the shoots a joint beyond the branches; damp the floors, paths, and pipes, if these are used, during bright days; admit air whenever it is practicable, and try to secure strength rather than length. Where a succession of grapes is wanted, start another vinery; proceed as detailed last month, or, if possible, defer it till the 1st of January, when you will receive the full benefit of the vivifying influences already adverted to.

2251. Continue to look over and preserve late grapes, and maintain a cool and equable temperature of 40° to 50°. If a gentle current of air can be kept up through the houses by night and by day, the fruit will keep all the better. Vine-borders may also be formed, or old borders renewed during this month. Instructions have already been given concerning the formation. Old vines may also be taken up where the borders are bad, the roots carefully preserved, a new border made and skilfully planted, and half a crop taken the first season. Young vines may also be planted in a dormant state or first started in pots, and then put in the border in June or July. I have planted young vines in the latter month that have ripened 15 feet of good wood during the first year. The great point in planting at any season is carefully to surround the roots, sprinkle some leaf-mould over them, and keep them within six inches of the surface. A mulching of dung or some litter will be necessary to prevent them being dried up; and if the vine is in full growth when planted, the top must be shaded a few days until the roots have laid hold of the soil; then let the top run as far as it chooses. Leave laterals and all on. The more growth for the next four months the better, because the larger the top the greater the number of healthy roots. Upon the number, nearness to the surface, and strength of these, all future success may be said to depend.

2252. In reference to sorts, nothing equals for general purposes the Black Hamburg. Taking it for all in all, we are never likely to see its like again; the Mill Hill Hamburg is also good, as well as the Golden Hamburg, when you can get it. I see this grape is put down in the catalogues as a great bearer. Well, it may be; but such is not the result of my observation and experience; it is a first-rate grape, but I fear a shy bearer. Next to the Hamburg, and infinitely before them in point of flavour, come the Muscats; and the only two that I care to grow are the Muscat of Alexandria and Muscat Hamburg. A black grape, with a *Muscat flavour*, has long been a desideratum, and now we have it. This grape appears to possess all the good qualities, and I fear most of the bad ones of Muscats,—the worst being a liability in many places to shank. My own vines of this variety, I am sorry to say, are considerably shanked; and I have seen some in pots this season utterly destroyed by shanking; nevertheless, it is a first-rate grape.

2253. Then for those who relish the best of all grapes, although, like many good things, wrapped up in small parcels,—there are the Black, Grizzly, and White Frontignacs—doubtless the richest-flavoured grapes grown. Next to them is possibly the Chasselas Musque, or Joslin's St. Alban's, which has a delicious flavour, but requires to be ripened in a very dry atmosphere to prevent it *cracking*. Then there are the Old Dutch and Buckland Sweetwater, the earliest grapes by a month, and the Royal Muscadine, one of the surest croppers, and the most useful of white grapes, of a sugar-and-water flavour. Then there is the West St. Peter's—the very best late grape—and Lady Down's Seedling, said to hang equally well, and also of first-rate quality. The much-talked-of Barbarossa will hang well, and is a noble grape, *when you can get it,* but *provokingly barren* would be its proper name, as it is certainly its true character.

2254. *Pines.*—Keep fruiting pines almost entirely dry if you wish them to start in January. Maintain a day temperature of 70°; night, 60° to 63°. This dryness may be necessary to throw the plants into bloom. Nothing does this more effectually than a check, although the check must neither be too severe nor too long-continued. Beware of moisture settling upon any pines that may now be in flower, as it often prevents the proper fructification of the blossoms; and deformed, or not formed, fruit is the consequence. Embrace every opportunity of admitting air when the external atmosphere will permit, and keep the plants within one foot of the glass. Succession plants, if kept tolerably dry, may be wintered in pits, at a temperature of 60°, with perfect safety. Beware of an excess of heat, or any sudden change of temperature, lest you cause premature growth or start them into fruit.

2255. At one time pines were the greatest luxury of the upper ten thousand; now, through the numerous quantities imported, they are brought within the reach of all; perhaps chiefly for this reason, they are not so generally grown as formerly. There is also a very prevalent idea that their cultivation is most difficult and expensive. The formidable treatises published on their culture have frightened many from undertaking it; and yet few plants are more easily cultivated. There is also about as much resemblance between a well-ripened English-grown pine and an imported one as there is between a mouse and an elephant. The former is generally a right royal, luscious fruit; the latter is very often not equal to a sweet turnip. Occasionally, however, good foreign pines may be had; but they can never compete for dessert on the tables of the wealthy with English ones; and there is no reason in cultural difficulties nor expense of production why every lover of this regal fruit should not grow his own. Houses for their culture have already appeared in this work. No peculiarity of structure is necessary. Doubtless the nearer the light they can be placed the better, although I have seen excellent pines grown under the shade of vines at least a yard from the roof. The most convenient, and ultimately the cheapest mode of supplying bottom-heat, is by hot water; I care not whether it is applied in tanks, open gutters, troughs, &c., or pipes; I believe pipes, and a hot-air chamber under the bed, are best, and least liable to accident. The bed to grow pines in should *be four feet deep,* to allow of the introduction of a sufficiency of plunging material to cover the highest pots, or the introduction of sufficient soil to plant the pines out in the bed. Doubtless this is the best, cheapest, and most efficient mode of growing pines. Prepare the bed thus:—Place six inches of rough brickbats for drainage, then a layer of broken bones two inches thick; on this a layer of rich loam, in whole pieces, with the turf inverted on the drainage, in solid pieces one foot square and two to three inches thick. Then fill up to within eight inches of the top, with this soil chopped into pieces about four inches square, mixed with broken bones and pieces of charcoal, and broken freestone instead of sharp sand. This is positively the compost that has frightened you so—with its one-sixth of this, its one-fifth of that, &c.,—or, rather, this is all that is necessary. The bones or charcoal give a sort of enriching power or *backbone* to the loam, and all other food is supplied afterwards, just and only when it is wanted in a *liquid state.* Now, then, secure some good Queens of any approved variety — a Sugar-loaf or two, if you please,—and some black Jamaicas or black Antiguas for winter ; as many Providences as you can find room for ; a few Montserrats, Envelles, and gold- and silver-striped for variety, and this is all you require. For the general crop nothing equals the Queens in flavour. Providences are the next best, and by far the noblest of all. See that your plants are perfectly clean and healthy, rather than large, when you purchase them. When pines once get infested with scale or bug, the best way is to consign them to the rubbish-heap at once. To prevent them becoming so, constant watchfulness, and the catch-and-kill-every-insect principle, is the only safe practice. Turn the plants carefully out of the pots, plant from three to five feet apart, according to the sorts, size of plants, &c. Providences require most space ; unwind as many roots as possible without breaking the ball too much ; earth-up the stem as high as the good sound healthy leaves (those that are otherwise should be removed) will allow you ; leave a hard, smooth surface, water with water at a temperature of 80°, and the work is complete. Plants thus bedded out will not require watering nearly so often as those in pots ; and if the entire surface is mulched over with cocoanut-fibre refuse, a good soaking once a month, in the growing season, will probably suffice. It is probable that, with generous treatment, most of these plants will fruit within eighteen months of the time of planting. When the fruit is cut, leave the leaves as little injured as possible. With amazing strength and rapidity, two or three suckers will spring up, and grow with the greatest vigour. One only should be left, and the others either potted for succession-plants or furnishing other fruiting-houses, or be thrown away. From a period varying from six to twelve months from the time of cutting one fruit, another will be ripe on the same stool. As the young plant on the stock advances, the old leaves on the latter may be reduced until all, or nearly all, are removed. At the same time the roots should receive a rich top-dressing of the same material in which they grow ; thus nearly eight inches will be left on the surface at planting, so as to allow two or three inches of fresh dressing to every new crop. This is essential to their well-being, as, from the suckers possessing a self-elevating power or proceeding from a few inches of the bottom of the stool, they could not have an independent support from the soil unless it was raised up with them. After a few years it may be necessary to remove the entire bed *bodily,* and begin at a lower level afresh. There can be no question that this is the cheapest, most rapid, and profitable system of management.

2256. The entire trouble of succession plants may be got rid off. No one scarcely ever thinks now of propagating pines by *crowns* and *gills,* when a sucker strong enough to fruit can be had in from six to nine months. The great feature is to make part of the supply of organizable matter that went to produce the old fruit available to the young plant. The stem is to it a magazine of the best food, laid up in the best form, in the most easily accessible place. Old routine said, wrench it away, and force it to nurture its babyhood on its own resources. Common sense and analogy demand that it should continue to live beneath its mother's fostering wing until its meridian strength is attained. Nevertheless, the two systems are not incompatible. The pot and bedding-out practices can be readily combined; thus only allow the same stool to fruit once, and pot, in place of planting out the stronger suckers.

2257. When the suckers are thoroughly rooted (which is often the case before the fruit is cut), and the fruit is cut, remove the stools, separate the suckers, make a new bed, and plant the latter singly as at the beginning. Under either plan it will often be necessary to pot quantities of the best suckers to keep up a good stock; form new beds, &c. When the beds get too thick, or the soil gets exhausted, begin as at the beginning. In growing pines in pots, there will generally be two potting seasons,—March, and June or July. Ten or 12-inch pots will fruit the largest plants, and as soon as the first are cut, and the suckers large enough for removal, the stools may be destroyed.

2258. In all work among pines, remember their leaves are their very life. Appearances also require that they should never be bruised or injured in the least. Practice alone can enable one to perform the necessary operations without bruising or breaking their foliage. We learn also rather to be proud of our own wounds and bruises as we admire the result of successful cultivation in the noble pine, which constitutes the richest part, and adorns all the rest of the dessert. The roots, too, must be carefully preserved. The facility with which pines emit roots up the stems, made the old gardeners reckless about those they already possessed: hence the wholesale disrooting once so common. But the emission of fresh roots does not necessarily supersede the use of those already formed. Neither do pine-roots die naturally annually; the more they can be preserved the better. The more mouths, provided there is food to fill them all, the more nourishment and strength will be imparted. It is the business of the cultivator to supply this food in a liquid state when and where it is wanted. Healthy roots and leaves convert it into pine fruit; consequently, the greater the quantity used, the heavier, yes, and the better-flavoured, the pine will be.

2259. *Peach-house.*—In many places the fruit-house is started this month. For instructions in the preliminary stages, see last month. I do not approve of allowing trees in late peach-houses and orchard houses to get frozen. The wood cannot bear cold so well as that nurtured out of doors; therefore the outside borders of early houses should be protected, as much to keep in, as to send in heat.

2260. *Fig-house.*—Lee's Perpetual fig is the best sort grown; the white Ischia and Marsella are perhaps a little better flavoured; but they are small. The plants in trees and pots should be thoroughly cleaned, new borders made, rapid-growing trees root-pruned and all top-dressed, &c., ready for an immediate start. The first batch of strawberries should also be introduced.

I find Cuthill's Black Prince the best for the early season, and if they can have a little bottom-heat, so much the better. Plants in 48-sized pots also do best for early work, the cramping principle again inducing fruitfulness. But strawberries remind me that my work here is done; and I would bid the old year farewell in the words of Withers, who, if neither a rich man nor a great poet, certainly sings sweetly and well:—

"Thou old and cold shivering year,
Now tottering downward to thy grave,
Thy thin robe fluttering in the wind,
Scanty thy locks with ivy bound;
Thy plume a feather of the reed,
All fringéd thick with hoary rime;
Chill is thy breath, hollow thine eye,
And from thine ears hang icicles:
I see thee cowering o'er the hearth,
Snapping the few long-hoarded sticks,
And swelling out thy wither'd cheeks,
In puffing them into a blaze.
Thou rais'dst upon the pond and pools
A cream of thick transparent ice,
To lure the urchins to their fall;
Then laid'st a flooring o'er the streams,
And where the barges glided once,
The skaters swiftly skim along.
Well, thou hast witness'd strange events,
And in thy annals much is writ,
That some would blush to have reveal'd;
But I have loved thee through thy life;
I loved thy smiling infancy,
Thy maiden bloom and woman's grace,
Thy matron care and hoary age,
And I will watch thee to the last,
And gently press thine eyelids down,
And bless thee for the many friends,
The sweetest flowers and richest fruit,
Thy passage hath produced me."

2261. While grateful for these and all other blessings, let us listen to Mrs. Sigourney, bidding us:—

"Look within thy heart,
While the poor shiver in their snow-wreath'd cot;
Or the sad orphan mourns; and if thou find
An answering pity, or a fervent deed,
Done in Christ's name, doubt not to be an heir
Of that true wealth which winter hoardeth up,
To buy the soul a mansion with the blest."

D. T. F.

§ 7.—HOTBED AND FRAME CUTIVATION.

2262. *Cucumbers and Melons.*—Little can be added to what has been already said. Let the weather be the principal guide as to giving air, &c.; be careful that the frames are ventilated without causing any draught, which might injure the plants considerably. See that the heat is maintained, and cover with mats at night; but do not shorten the days more than they are. heT mats should be taken off as soon as it is light in the morning, and not put on till it is getting dark at night, so that they may have all the daylight they can get.

2263. *Cold Frames* should receive the same amount of attention. Lose no opportunity of exposing the plants freely to the air; more harm is done by not doing so than is generally imagined; the plants are started into a sickly growth, damaging to the crop and discreditable to the manager.

2264. "Where there is a will there is a way," is an old saying, and I believe a true one. There are many plants naturally too tender to stand our winters, but which it may be desired to keep. Both in the flower and kitchen garden, there are subjects which may be preserved by a little judicious management. In the first place, some plants that are called half-hardy will continue to grow in the winter long after very tender subjects have been killed by the frost. I have often noticed verbenas, calceolarias, gazanias, &c., flourishing up to February, when a frost more severe than formerly comes and kills them. Had these plants received the protection of a frame at that moment, they might have been kept through it: consequently, we know, that by securing a number of such things in frames in the autumn, they may be kept during the winter; but they must not be crowded together, and should have good hold of the soil before winter. The frames should have a foot or so of earth or rotten dung banked round them. This will resist the frost at the sides: it may be kept out at the the top by judicious covering and uncovering; that is, never leave the covering on more than one night without moving it.

§ 8.—WINDOW-GARDENING.

2265. Beginners are very apt to make a mistake in supposing their first efforts in plant-culture should, of necessity, be successful; the contrary is in general the case. First attempts, in ninety-nine cases out of every hundred, are merely so much profit and loss,—loss in plants, and knowledge gained of the necessary treatment. Gardening, like every other art, requires not only practice, but observation; and those who have most failures, provided they observe the causes of failure, are likely to become the most skilful in the end. Many ladies and gentlemen occupy themselves daily among a few choice plants, and through the cause indicated, have become proficient in the management of them, feeling amply rewarded for the pains taken by the new beauties successively unfolded by the plants.

2266. The most necessary condition to successful culture is to have proper appliances,—that is, under certain considerations,—for instance, provided only a window is available, then it should be fitted with a ledge or shelf, both inside and out, so that the plants can be close to the glass when inside, where they can have the full light; and also that they can be exposed to the open air on every occasion when the weather will permit. If a window is fitted in this way, half a dozen plants can be grown creditably, with very little trouble. They can be placed outside for the purpose of watering them, even in winter; and in wet weather they can be inside, with the window open. This will give them plenty of fresh air, which is most essential to their well-doing, without exposing them to heavy rains; and as showers often take place in mild weather, it would be as injudicious to shut them up altogether as to expose them to it. The advantage, therefore, of being able to move the plants in or out in a very short time will be apparent.

2267. Again, supposing the window is fitted with double sashes,—in other words, a window-recess is fitted so as to form a sort of plant-case, giving the full height of it,—thereby sufficient head-room is obtained to grow tall plants or climbers: beneath a trough lined with lead or zinc, or other non-corrosive material, will be necessary. This should be sufficiently large to hold a proper quantity of soil,—say a foot in depth, and of length and breadth adapted to its position,—providing means for the exit of surplus water, and the ventilation should be perfectly under control. The size of such a plant-case must of necessity be a matter of taste or convenience; but the larger it is the better for the plants. Fuchsias are very suitable subjects to grow in such a position; and as some of them are tall and erect growers, as Wonderful; others drooping, as Duchess of Lancaster; and others, again, of small close habit, as most of the fancy varieties,—they can be so arranged as to fill out the interior of the case; and if care is taken to prevent crowding and disorderly growth, both the foliage and flowers will be exceedingly ornamental.

2268. There are always ways and means with those who have the will, and such contrivances for plant-culture have been successfully carried out; but instances are exceptional. From my own observation, I believe almost everybody desires to understand something of plant-treatment; and, whether possessed of a garden or not, the question is, how shall I manage my plants so that they will bloom again? This generally refers to plants purchased of hawkers or at the nursery, while in bloom, and which begin to decline in health simultaneously with the fading of the flowers. Many have attempted to answer the question, and rules have been laid down which have only had the effect of making the querist as wise as before. There are certain conditions necessary, not easy to define. The culture of a plant differs from a mechanical operation, inasmuch as the latter is under control; but, in growing a plant, nature must do the work, while we supply the material. If left in a state of nature, a plant is usually placed where it can supply itself with material for supporting life and health; but if it is to grow where we choose to place it, it becomes necessary to ascertain the processes by which that object may be gained,—processes more easily seen than described. A plant, however artificially grown, is still a small piece of nature, and must be considered as such. Nature is governed by certain laws, and obedience to those laws is essential even in the culture of a geranium. Generally plants are treated too artificially; instead of simply supplying the material for nature to work upon, her efforts are frustrated or counteracted by supplies either too great or too small, or of an unsuitable kind.

2269. Heat, light, moisture, air, and soil or earth, are essential matters to be brought into requisition in plant-culture; both the quantity and quality of these, however, must be considered. Heat, probably the prime mover, must be supplied within certain limits, and regulated by the natural habitat of the plant; tropical plants must have tropical heat, unless they are natives of the temperate climates, or of high mountains and table-land. Nothing that I am aware of will grow in a temperature under 32°, or over boiling-point. A happy medium of from 40° to 80° is best for most plants.

2270. Light is most essential to the well-doing of plants of any kind; the want of it is sure to be indicated by a weak, pale, and spindling growth, the result of placing the plants in a room far away from the glass: the more directly overhead they receive light the better; but the ordinary variations of light and darkness are of no less consequence, since it is said that plants inhale under the influence of light, and respire in the dark.

2271. Moisture, again, so necessary for the support of plants, must be supplied in proper quantities. When shall I water my plants? is a vexed question, yet one that will admit of no definite answer, as some plants want more than others; some more or less at certain times, or under particular circumstances. Observation and tact must be exercised,—useful qualities under any circumstances, and particularly necessary in the cultivation of plants.

2272. Ferns are by many considered to be a remnant of the vegetation of a past era in the history of the earth, and associated with that rank luxuriant growth, some remains of which are seen at the present day. The treatment they require would seem to confirm this view; most of them delight in a loose soil, abundant moisture, and a warm humidity in the air. Many kinds are hardy; some are native of our own climate: yet it is observed by experienced cultivators that those species which are found in temperate climates grow much finer in tropical ones; that sorts that live in England in the open air grow luxuriantly in a stove; showing that, under a higher temperature, they become much more largely developed. However, in the cultivation of them, it is not necessary to go beyond what is ordinarily done. Hardy sorts may be grown out of doors, and those that will stand a greenhouse temperature are as well grown in a greenhouse as anywhere: they will be none the better for increased size, but rather the contrary. The serrature of the fronds, the form and position of the fructification, would be less interesting if the fronds themselves were enlarged. Some kinds, indeed, are naturally large, and the larger the more valuable,—as the Dicksonias or tree-ferns; but these require a large house to grow them properly. Our object is less to speak of particular genera than to give a few hints for the culture of them as a whole.

2273. In planting the fern-case, it is best to choose sorts of very dwarf compact habit. This will allow for a little drawing up of the fronds from confinement. A mixture of loam, leaf-mould, and sand, will be best for them to grow in; but it should be liberally mixed up with broken pieces of sandstone, or broken flowerpots, and small pieces of charcoal. These will hold a supply of moisture without stagnating; but water should remain unabsorbed, so that the cases must be provided with suitable drainage; and although the confinement of the case will agree with many ferns, yet some ventilation is necessary to prevent damp and mouldiness, otherwise every frond or dead piece of leaf that touches the glass will cause a general decay.

2274. Out-door ferneries are usually constructed in a shady nook, a damp situation on the margin of ponds, or in low-lying situations, where they would naturally receive that shade and moisture which agree with them; otherwise they are grown on a shady bank, where water can be supplied artificially, and it requires a great deal to preserve the healthy greenness of them during a dry summer. If once allowed to flag, they get spotted, which diminishes the beauty of them, and they do not recover it the whole season. In building a fernery, make a liberal use of rough blocks of wood, gnarled roots, and blocks of stone, burrs, &c. Let there be no appearance of labouring to produce an effect, but let the whole wear an easy natural appearance. Plant the ferns so that they show in niches and crevices, and not so thickly as to hide the burrs, &c. For out-door culture none can surpass hardy British ferns. Some of these grow much larger than others;—the Male fern, the Lady fern, the Buckler fern, the Hart's-tongue fern, are among the largest growers. The common brakes grow larger than any, and should not be admitted unless there is plenty of room. There are ferns that have a similar habit to that on a much smaller scale—as the various sorts of polypody, and these are very useful for the front places: they should not be allowed to be overgrown by others. There are a great many ferns of dwarf habit, known as natives of this country, yet requiring careful management to induce them to grow in a fernery; the Rue fern, for instance, seldom lives many years, except in the hands of very clever cultivators: but there are plenty that can be grown easily, and it is best to begin, at least, with them.

2275. Greenhouse ferneries may be made in every way similar to those outdoors, only on a smaller scale, but with the same view as to shade and moisture. If in an open spot, the top must be furnished with blinds, the syringe must be kept at work, and, if kept close and warm, the ferns will grow luxuriantly.—F. C.

§ 9.—GARDENING FOR SMOKY CITIES AND LARGE TOWNS.

2276. Already, under the head of Window Gardening, ample information has been given in these pages for the internal floral decoration of our houses, wherever situated, whether in towns or in the country; but hitherto little has been said upon the subject of outdoor gardening as applicable to our cities and large towns, where black smoke prevails. It is well known to every one that the vapour arising from substances in a state of combustion, which is usually termed smoke, is very prejudicial to vegetable life. Without taking into consideration the deadly effects arising from the diffusion of smoke generated in certain factories—more especially chemical works—which is fatal in proportion to the nature of the substances employed, and from which the smoke is evolved, it is sufficient for the gardener to have to combat smoke arising from ordinary coal-furnaces and the thousands of chimneys for domestic use which surmount our crowded dwellings. Smoke of this sort is generally considered to consist of two parts,—gaseous exhalations and certain minute particles of carbonaceous matter called soot. Both these constituents are capable of producing more or less injury to the bark, leaves, and blossoms of whatever trees, shrubs, and plants, are brought into contact with them. Soot, applied as a manure to the soil, is a decided fertilizer, or perhaps it would be more correct to call it a stimulant to vegetation ; but this is a very different application of soot from that with which vegetation is treated, when it is found struggling for existence against the dense masses of soot which are emitted from the chimneys of our populous cities and large towns. The gaseous vapours charged with soot form a black gummy coating over the stems and leaves, which prevents the respiratory organs of plants from performing their proper functions for the support of life. Still, so tenacious is Nature of her own rights, that even in the most murky and sooty atmosphere something green will be found growing. Indeed, the traveller through our coal districts is often struck with the luxuriance of the corn crops growing even up to the pit's mouth, and with the manner in which large trees have been able, at any rate, "to hold their own" in the severe struggle which they have had for years to maintain. We ourselves have vivid recollections of having seen, in the midst of "the black country" of South Staffordshire, at the foot of Dudley-Castle hill, several years ago, many very gay gardens in front of the cottages of the pitmen. Though Flora and her attendant train of Nature's beauties rejoice most in clear fresh country air and the pleasant places of the earth, it is a great mistake to imagine that they voluntarily banish themselves from, and cannot be invited to dwell in, the dark and sooty regions of mining enterprise and manufacturing industry, or where men densely crowd their dwellings together for purposes of business and professional intercourse. Of course it would be as useless as it would be foolish, under such unfavourable circumstances, to attempt the cultivation of all sorts of shrubs and plants indiscriminately ; but it should be a matter of thankfulness that some sorts will grow, and that experience has pointed out those which will flourish and do best. It is the same with vegetable as with animal life ; so varied are the gifts of Nature, that the same atmospheric conditions are not essential to the welfare of every individual, nor is the same food requisite for its support. The old proverb, "one man's food is another's poison," may be made to apply to both. It is not every constitution that can stand the extreme heat of the drying-rooms of some of our factories, much less the vitiated atmosphere of those stifling chambers to which our needlewomen and dressmakers' apprentices are too often consigned ; and so it is with plants. Attempt to grow the delicate white China rose within the influence of London smoke, and it will not only disappoint you in flowering, but in a short time the plant itself will wither and die, while the common cabbage-rose, and even the maiden's-blush, under precisely similar circumstances, will flower freely and live to a good old age. It is necessary, therefore, to know what trees, plants, and flowers will flourish best; and such knowledge to begin with will be the means of saving much trouble, disappointment, and expense. The following remarks are intended to be of service to those who are not unwilling to attempt what at all times must be regarded as "gardening under difficulties;" but with what good results the attempt may be made let the Temple Gardens testify. Greatly changed for the worse is the atmosphere of London since Warwick prophesied—

> "This brawl to-day,
> Grown to this faction in the Temple Garden,
> Shall send between the red rose and the white
> A thousand souls to death and deadly night."

Yet we venture to affirm that the great earl saw nothing half so gay around him as may be now seen in this same spot, notwithstanding dirt and soot. To Mr. Broome, the intelligent superintendent of these ancient gardens, all who live in smoky cities, and who still love flowers, owe a deep debt of gratitude. He has shown what may be done, and he has also left on record his own experience as to the best mode of doing it. "Fresh from the country," writes Mr. Broome, "having received initiation into the mysteries of my profession in the gardens of one of the wealthiest of our nobility, I was but little prepared for the difference which exists between the growth of plants in the country and in large towns. Those which in the pure air of the former grew almost spontaneously, would, notwithstanding the pains bestowed upon them, barely arrive at maturity in the smoky atmosphere of the latter. My previous experience availed me but little; I had almost everything to unlearn; however," continues he, "I set about my task with diligence, coupled with patience and perseverance, and have been rewarded by a complete triumph over all such difficulties as were not insuperable."

2277. Some persons, perhaps, may imagine that outdoor gardening under such adverse circumstances can hardly repay the trouble that must be bestowed upon it, and that the subject loses its interest because there are not many persons who have much opportunity or convenience for availing themselves of it, so small a space in general being allotted in most cities and large towns to each house beyond the plot of ground which it actually stands upon. But why should even the smallest courtyard not be turned to the best account? Why should any open space be deprived of a green tree, a few shrubs and plants and flowers, to ornament it? Why should the back drawing-room, as is so often the case even in good houses, have nothing better to look out upon than bare walls and a dirty pavement? It should be observed that turf grows well under the influence of smoke, that trellis-work will hide any unsightly object, and the large quick-growing Russian ivy will soon cover a wall; a light verandah, also, at the drawing-room windows may be made available for creepers. The common nasturtium will do well, and so will the different varieties of tropæolum, also canariensis; but care must be taken that they do not suffer from drought, for drought in a smoky atmosphere is far more injurious to plants than it is where the air is clear and pure.

2278. The following list will be found to contain most of the trees, shrubs, herbaceous plants, and annuals, at present introduced into this country, which are not so susceptible of the injurious influences of a vitiated atmosphere as many others, and which are consequently suitable for our cities and large towns :—

Morus nigra.
Taxus baccata and fastigiata.
Clematis flamula.
,, vitalba.
,, montana.
Magnolia grandiflora.
,, conspicua.
,, glauca.
Mahonia aquifolium.
Hypericum calycinum.
,, elatum.
,, Androsæmum.
Acer pseudo-platanus.
,, rubrum.
Negundo fraxinifolium.
Æsculus Hippocastanum.
Staphylea trifolia.
,, pinnata.
Ampelopsis hederacea.
Enonymus europæus.
Ilex aquifolium, and varieties.
Rhamnus Alaternus.
Aristotelia Macqui.
Rhus typhinum.
,, Cotinus.
Sophoria japonica.
Spartium junceum.
Genista purgans.
Cytisus Laburnum.
,, alpinus.
,, scoparis.
Robinia pseud-acacia.
Wistaria sinensis.
Fagus sylvatica.
Mespilus germanica.
Chronathes virgineum.
Amygdalus communis.
Cratægus oxycantha, and varieties.
Pyrus aucuparia.
Philadelphus grandiflorus.
Rubus—varieties.
Cornus mascula.
,, sanguinea.
Acuba japonica.
Sambucus nigra.
Viburnum Opulus.
Symphoricarpos racemosus.
Santolina chamæcyparissus.
Artemisia Abrotanum.
Rhododendron ponticum.
Phillyrea—sorts.
Syringa—varieties.
Fraxinus—sorts.
Bignonia radicans.
Jasminum officinale.
Vinca major.
Lycium barbarum.
Phlomis fruticosa.
Daphne Mezereum.
Ulmus—sorts.
Juglans regia.
Salix—sorts.
Populus fastigiata and nigra.
Betula alba.
Thuja occidentalis.
,, orientalis.
Hedera Helix, and varieties.
Chrysanthemums—varieties.
Helleborus niger (Christmas rose).
Aster—varieties.
Sunflower.
Achillea lingulata.
Dracocephalum.
Lavender.
Epilobium angustifolium (willow-herb).
Mignonette.
Hollyhocks.
Dahlias.
Sweetwilliams.
Foxglove.
Antirrhinum.
Ageratum.
Verbenas—varieties.
Scarlet geraniums.
Alyssum.
Polyanthus.
Lily of the Valley.
Pinks.
Carnations.
Wallflowers.
Mimulus.
Hardy phloxes.
Rockets.
Crocus.
Snowdrop.
Virginian stock.
Calceolarias.
Gladiolus.
Daisies.
Heartsease.
German stocks.

Dwarf Roses.

Rose de Meaux.
Provence.
Maiden's blush.
And most of the common hardy annuals.

2279. The above list is sufficient for every purpose of ornament and gaiety. In so long a list it must be obvious that some things will do better than others ; but all are worth planting, as all have been known to live in a smoky atmosphere. Of trees, the plane, which sheds its bark annually, and the poplar in its different varieties, are decidedly the best where the air is most charged with soot.

2280. Besides chrysanthemums, as we learn from Mr. Broome, a very fair display may be obtained throughout the year of other hardy flowers which will thrive in London smoke, and may be grown with success in most of the squares and small gardens in large cities and towns. And to those persons who take an interest in the vegetable kingdom, and wish to grow a few plants or trees for ornament in confined places, to save them unnecessary expense in purchasing what will not grow, I here give my thirty years' practical experience of what I have found to succeed, and keep up a succession of flowers through the year. As a winter flower, the Christmas rose (Helleborus niger) does very well. Snowdrops, too, bloom very freely. Next come the crocus and tulips of different colours: these do remarkably well, and if planted in October, in beds or good-sized patches, will, in March or April, make quite a show, and form a pleasing mixture with the common primrose.

2281. "In the middle of February sow round the crocuses a good quantity of Virginian stock, purple and white alternately: the leaf of the crocus shelters the young stock from the frost and cold March winds; and when the crocus has done blooming, either cut the leaves off or twist them round, and give them a tie to allow the Virginian stock fair play. This comes in succession to the crocus, and when sown in large patches in beds, has a very pretty effect. I generally plant a large quantity of the common wallflower, choosing the darkest varieties. These flower a long time, and smell very sweet. They should be planted rather deep, and require a good quantity of water, or they soon flag. The gladiolus is a very excellent bulb for town borders, if planted in March in a strong loam, leaf-mould, and rotten dung, and plenty of water when the hot weather sets in. The daffodil and narcissus do very well. Next come the white candytuft and the yellow alyssum, which bloom at the same time. These strike from cuttings in the summer, and keep in a cold frame all the winter. Next come the Iris germanica and the rocket. Daisies and heartsease do well, and flower a long time. The calceolaria does exceedingly well, and flowers all the summer. Cuttings of these should be put in a cold frame in October, and merely require the frost to be kept from them. I peg them down like verbenas, instead of stopping them. The result of this is, that I obtain an earlier bloom: they throw out their laterals quite as well, and the wind is prevented from breaking them off. . . . When it is very hot, throw round the roots a little mulch or mould, to keep their flowers from drooping. Intermediate stocks do very well, and flower all the summer: these I sow in September, under a hand-glass. When old enough, prick out three or four plants in No. 48 pots, in a compost of loam and a little rotten dung, taking care they do not get too much wet. In November put them in cold frames for the winter, never watering except they flag, and plant out in February, as they will bear a little frost. Scarlet geraniums do very well. The Ageratum mexicanum does very well. I put in cuttings in October, which I manage to keep through the winter. You may also put in cuttings of this in the spring, which will flower very early. Verbenas flower well all the summer, but are difficult to keep through the winter, as they damp off in December and January for want of better air. The dark clove-carnation is very hardy, and flowers beautifully. These I propagate by hundreds in the autumn, potting some in cold frames, and letting others remain out of doors. The sweet-william, lupinus, polyphyllus, scabiosa, antirrhinum, polyanthus, foxglove, and lily of the valley, do remarkably well. The fuchsia, if planted in a cold shady place in summer, flowers tolerably well, but must be attended to in watering, or the flower drops before opening. Plant them in leaf-mould, rotten dung, and yellow loam. If the weather is very hot and dry, cover the surface with a little rough rotten dung. The mimulus is a famous town flower, but requires plenty of water. Some of the hardy phloxes do pretty well. The double rocket flowers freely, and if the first bloom is taken off when faded, the plant will bloom again as freely as ever; but it requires a great deal of water. I would recommend nearly all the common hardy annuals, especially branching larkspur, the Phlox Drummondii, lupinus, coreopsis, &c. Balsams do very well if the seed is sown in a little hotbed, supposing you have the convenience to make one; it will also answer for china-asters, and when ready to be planted, mix plenty of leaf-mould and rotten dung in the borders for them, as they do not bloom freely without a rich compost, and being abundantly supplied with water. Have nothing to do with tender annuals: they are poor, sickly-looking plants for town gardening. The common pinks do exceedingly well. The willow-herb (Epilobium angustifolium) is a very showy common flower, and will grow anywhere. Mignonette does well. Sow it for early blooming in January, in a little heat in 48-pots, in light mould to turn out. There are numbers of herbaceous plants that do very well, such as the Michaelmas daisy (aster), double sunflower, Achillea lingulata, Dracocephalum speciosum, sea-lavender (Statice latifolia), and all hardy plants of this class. The common English ferns thrive very well in shady parts, by watering every day in hot, dry weather. Plant them in leaf-mould, loam, and common sand, and mix with them a few plants of periwinkle and some rockwork; but be careful not to disturb them while forking up the borders. Hollyhocks do very indifferently, and are not worth trying. Dahlias do exceedingly well if well supplied with water, and carefully thinned as they advance in size. They ought to be planted very early in the spring to get an early bloom; as they are not required in September, the chrysanthemum taking their place, I generally cut them down in this month. Last year I pegged them down all the season, and kept them close to the ground by pruning, and they bloomed well. You ought to be particular in your selection not to purchase hard-eyed ones, as the ground becomes so hot and dry at the close of the summer, that they never bloom fully out. Among the best are, Beauty of the Grove, Richard Cobden, King of the Yellows, Mr. Glenny, Beeswing, Brilliant, Empress, Annie Salter, Beauty of Slough, Fearless, and other free bloomers of this class.

2282. "Respecting shrubs and deciduous plants," continues Mr. Broome, "few of these do any good. The lilac blooms very scantily, but does well for a screen, as it shows a little green in the summer. The Aucuba japonica answers in sheltered places. The enonymus does very well in smoke, and retains its foliage; but this year (1860) the severe winter has nearly destroyed it. This shows it is not so hardy as many other shrubs, and requires to be covered with mats on very severe frosty nights. The box, holly, and privet, thrive for two or three years; rhododendrons flower freely for a season, with plenty of water, all through the summer. The hibiscus rose, or Althæa frutex, grows and flowers remarkably well. The Daphne Mezereum does well, and flowers freely, both white and pink. The dwarf roses, such as Rose de Meaux, Cabbage, Provence, Maiden's blush, York and Lancaster, are now doing tolerably well in these gardens, considering the murky atmosphere they grow in. I tried some dwarf standards, and they more than answered my expectation, as, after planting them in good maiden loam, and attending to their watering, some bloomed all the season. Madame Laffay, Jacques Lafette, Mrs. Eliot, Géant de Batailles, William Jessey, Duc d'Aumale, and several others, gave great satisfaction; but, of course, they require attention in taking off the seed and in watering. It is something to have a rose at all in this smoky town. Those grown as dwarfs on their own stocks do much better than those worked on the briers. The higher they are from the ground, the more smoke they get on the stems; consequently, dwarf plants near the ground are best.

2283. "As respects forest-trees nothing does so well as the oriental plane, in consequence of its shedding its bark every spring: by so doing, it gets rid of the soot, which sticks to other trees like varnish, and which there is no getting off. You may train it to any habit you please by pruning, and the more confined it is, the better it does. The lime-trees do very badly; but the elm and thorn tolerably well. The Lombardy poplar is a capital tree for London. Irish ivy does very well where you want to cover a wall. The turf stands smoke as well as anything, and when the situation is open, looks remarkably well. Hundreds of children freak and play, and roll on the turf in the Temple Gardens every summer's evening, and when they are closed for the season, you would think it could never recover; but in a few weeks, with a little rain and rest, and a slight covering of fine mould, it springs up like a mushroom. Should there be any very bare places, I break it up three inches deep; sow a little mixed lawn-grass, cover it over, roll it down, and it is up in three weeks if there comes any rain. Under trees, I sow the Paris everlasting rye-grass, as that is stronger than the lawn-grass, and does better to trample on."

2284. Such is the practice in the Temple Gardens, and every one who wishes to see what can be done in the way of gardening under the most untoward circumstances of atmosphere, will do well to pay a visit to them. It is strange that those who live in the noble squares, and about the inclosed crescents of our large towns, and especially of our metropolis, should have remained so long without profiting by the experience and example of Mr. Broome. Few places are worse kept than our London squares. Their cold, dreary, and comfortless appearance, is the remark of every stranger, and yet, in a general way, there is no lack of wealth in the dwellings around, and, doubtless, the means for their improvement would soon be found, if a few of the principal inhabitants would only spare the time, and exert a little energy and taste upon the subject. Let a garden committee be formed in each square, or wherever there is a space of ground needing cultivation, in which the surrounding inhabitants have an interest, and let funds be raised by means of rate or subscription. As soon as this is done, let a contract be entered into with some respectable nurseryman to keep the inclosure in good order, and gay with shrubs and flowers.

2285. Many of our large nurserymen would take the contract for a much smaller sum than most persons would imagine, and would find it their interest to keep the place as gay and attractive as possible ; for a square in London, or any of our large towns, would become an excellent advertisement, and tend greatly to increase the business connection of any respectable man. Beyond the trees and large evergreens, everything should be the property of the contractor, who would thus have the liberty of bringing in and removing whatever he might think fit. This must be regarded as the most important part of the engagement on both sides ; for very many things, as the whole list of American plants, rhododendrons, kalmias, &c., will flourish well for one season in smoke, but if left longer they would not only cease flowering, but die. It would, therefore, be as much the interest of the committee as of the contractor, that these should be removed late in autumn, and replaced by others the following spring. The inhabitants would thus enjoy a succession of these most beautiful spring-flowering plants, and the contractor would suffer no loss in the exchange, as such things, and many others, may be moved at their proper season without the slightest harm.

2286. Mr. Broome's idea of conservatories for squares might then be carried out ; for the contractor would, doubtless, find it his interest to erect some light ornamental building or iron-work for his own convenience, in keeping up a supply of bedding-plants, &c., for the square, and for the window and indoor decorations of the houses around, when all such things would, doubtless, find a ready sale. We accord fully with Mr. Broome's observation. "There is not a square in London that would not be much improved by its little conservatory. Glass is cheap enough now, and the cost of a light ornamental framework of iron would be a mere trifle among our rich citizens who reside in that locality, and they would have an ornamental object to look upon from their houses. A hot-water apparatus heated with coke would cause no nuisance by way of smoke : in fact, the artificial heat would not be wanted except on very frosty nights, as the air of London is much warmer than that in the country. Birds, gold-fish, and many interesting things, might be introduced to amuse the younger members of the family."

2287. In the foregoing remarks we have said much about the necessity of well watering, and it must be remembered that deep digging and plentiful manuring are not less essential in the sooty atmosphere of our crowded towns.

Every year the collected surface-soot should be buried by trenching about 18 inches deep, and a good dressing of manure be worked in to renovate the soil.

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§ 10.—AMERICAN PLANTS AND CAPE BULBS.

2288. It was long thought that American plants, as the rhododendrons, azaleas, kalmias, ledums, andromedas, and daphnes as are generally termed, would only grow properly in bog-earth. The success with which they bloom, even in a stiff unmanageable clay, has long dispelled this notion. Mr. Errington has also aided in introducing a less pedantic style of growing these beautiful ornaments of the shrubbery. "In consequence of some alterations at Oulton Park," he says, "an old rubbish-yard had to be turned into the ornamental portion of the grounds, and an elevated mound of American shrubs planted on the site. The first proceeding was to burn, or rather char, the decayed vegetable matter in the yard, and throw the ground into shape; and a coating of coarse clayey matter happening to be the nearest commodity, was spread over the surface a foot thick. Next we applied several loads of leaf-mould, and, finally, three inches of fine heath-soil from Delamere Forest. All these materials were thoroughly blended together to a considerable depth, the raw and undecomposed rubbish, as it came up again, being buried in the bottom of the trench. On the mound thus raised the shrubs were planted, and nothing can exceed their robustness. The ericas, especially, exceed all I have ever seen, from the admixture of the clay with heath and leaf-mould."

2289. The materials, with their proportions, stand nearly as follows:—Sand one part, clayey subsoil matter two parts, decomposed vegetable matter two parts, undecomposed vegetable matter five parts. "At the bottom of all this there still remained a quantity of rubbish and raw vegetable matter, which the roots of the more vigorous plants will reach, and find food in abundance in due time."

2290. The following materials, to abbreviate Mr. Errington's papers, all of them within the reach of most persons, may be made to form a compost adapted to the culture of American plants:—Rotted leaves, spent tan, saw-dust, old thatch or straw, weeds, grass-mowings, and vegetable refuse of all kinds,—old manure, even the bottoms of old wood-stacks. Any or all of these in a decomposed state, blended with a certain proportion of garden soil, may be rendered fit to grow American plants; but as it is the character of all decomposed vegetable matter fit to enter rapidly into the composition of the vegetable fabric, to subside rapidly, this must be guarded against by employing also such organic matter as tree-leaves, lumps of peat, peaty turf, or other vegetable matter, which will take long before decay takes place. Where old tan or saw-dust is liberally used, the leaves should be fresh, those which have been used as linings for hotbeds by preference, from their tendency to mass together. Old thatch or litter forms an excellent basis for the whole clump, and weeds and other vegetable refuse, when burnt or charred. This compost, with a subsoil sufficiently retentive of moisture, and situation not too much exposed to the direct influence of the sun, will grow these beautiful shrubs in great perfection.

2291. Rhododendrons may be planted in masses, clumps, or singly, if the soil is suitable. This noble shrub requires a soil of rather stiff and tenacious clay, and the stations prepared for the plants should be filled with a portion of this soil, mixed with peat-earth. A splendid and immediate effect is produced by forming a mound, and planting them upon it; and where the space permits, this effect is enhanced by placing masses of rock at the base of the mound, and bushy specimens on the ground-level; but this requires considerable space, and would be out of place in a small garden. The best use in a small garden for these plants would be to mask some north wall, which was high enough to shelter them from the southern sun, and not so high as to overshadow them.

2292. The Indian azaleas require more delicate treatment than their more hardy congeners. They live and grow in a low temperature, however, and are not materially injured by a few degrees of frost; but while growing, a moist warmth and equable temperature are essential to their flowering properly. Their bloom-buds are now getting forward, and if there are any lateritias or præstantissimas, or others of the same habit in the collection, their bloom should be retarded by placing them on the north side of a wall. Plants only which show no bloom should be re-potted.

2293. Pelargoniums, calceolarias, and many other soft-wooded plants, will also grow in a low temperature; but no large, full-grown specimens of either can be grown in perfection to flower in the summer where they are kept in a lower temperature than 50° till they bloom. The former require assiduous attention now; growing plants require continual watering, so that they never flag, otherwise the lower leaves, which are essential to the appearance of the pots, become yellow. Manure-water, prepared from equal parts of cow, horse, and sheep dung, with a little lime, mixed together in a large tub of rain-water so as to form a paste: this is allowed to settle, then drawn off to keep it clear. This applied once a week for the present, mixed with two parts of soft water, will materally increase the vigour of the plants. Calceolarias now require a final shifting into a light rich compost, pegging them down, and watering cautiously, and fumigating freely for the green-fly.

2294. *Cape Bulbs.*—Charming in their foliage, abundant in their flowering, and of easy culture, these plants have but one fault,—they are a very short time in flower. Mr. M. Saul, the gardener to Lord Stourton, says of them, "I have seen hundreds of flower-gardens perfectly dazzling with scarlets, yellows, and blues of every shade; but I declare I have never witnessed anything to equal the beauty and grandeur of some beds of these truly delightful genera which I once saw in full flower in the open garden. They were protected from the north by a wall, behind which grew a row of trees, and consisted of the gladiolus, ixia, sparaxis, tritonia, watsonia, and anomatheca; all remarkable for the delicacy, brilliancy, and distinctness of their flowers."

2295. In the open ground, a south border, sheltered by a north wall, is most suitable for their growth. It should be well drained, nothing being more prejudicial to them than a wet bottom; the soil turfy loam, a little peat or leaf-mould, and a little sand. The bulbs should be planted about six inches deep any time in October, and during the winter months the bed should be covered a few inches thick with tan or dry litter, removing it as soon as pretty fair weather sets in in the spring.

2296. When grown in pots, the same soil will suit them; potted in October, they should be protected in a cold frame or pit. They will require little or no water till they begin to grow in spring. When they have made a little growth, they may either be planted out in a warm border, or placed on the shelves of the greenhouse near the lights, and watered regularly to keep them in a growing state till the foliage shows signs of maturity; water must then be withheld. When at rest they should be kept quite dry.

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ERRATA.

Page 2, *for* "asparagus weighing 3lbs.," *read* "weighing three to the pound."
Page 43, par. 113, *read* "30*s*. to 35*s*. the 1,000."
Page 249, par. 674, *read* "fig. 7" *for* "fig. 6."
Page 548, sixth line from the top, *read* "well-rolled turf" *for* "well-rotted turf."

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